DEMETRIOU, DEL GUERCIO, SPRINGER & FRANCIS, LLP
ATTORNEYS AT LAW
801 SOUTH GRAND AVENUE, 10TH FLOOR
LOS ANGELES, CALIFORNIA 90017-4613
(213) 624-8407

JEFFREY Z B SPRINGER
STEPHEN A DEL GUERCIO
MICHAEL A FRANCIS
REGINA LIUDZIUS COBB
JOHN E MACKEL III
BRIAN D LANGA
JENNIFER T TAGGART
TAMMY M J HONG

CHRIS G DEMETRIOU (1915-1989)
RONALD J DEL GUERCIO (RETIRED)
RICHARD A DEL GUERCIO (RETIRED)

FAX (213) 624-0174
WWW DDSFFIRM COM

SENDER'S EMAIL ADDRESS
BLANGA@DDSFFIRM COM

September 11, 2007

Mr. Andrew Taylor
Case Developer
US Environmental Protection Agency
Region IX
75 Hawthorne Street
Mail Stop SFD-7-5
San Francisco, California 94105

Re: **Supplemental Response to Request for Information – American Polystyrene Company Facility at 1225 West 196th Street, Torrance, California ("Site")**

Dear Mr. Taylor:

This firm represents BP Amoco Chemical Company ("BPACC") with respect to Amoco Chemicals Corporation, Amoco Chemicals Company, and Amoco Chemicals Company in connection with the Site. On May 9, 2007, BPACC responded to the United States Environmental Protection Agency's March 29, 2007 Request for Information ("Request"). Therein, BPACC stated it was continuing to review its records and would produce additional responsive information should it become available. The following and enclosed supplement BPACC's May 9, 2007 response.

Nothing in this supplemental response to the Request shall constitute an admission of liability for the Site. BPACC and its parent, subsidiary, and affiliate corporations reserve the right to contest any allegations made against BPACC or its parents, subsidiaries, or affiliates with regard to the Site by any person or entity. By responding to the Request, BPACC does not waive any applicable privileges, including but not limited to, attorney-client privilege and attorney work product doctrine.

Further, BPACC reasserts its objections to the relevant time period for the Request which was not defined. Therefore, the Request is overly broad and imposes an undue burden upon BPACC. BPACC responds with respect to the time period for which it has knowledge, but undertakes only to respond to the Request for the time period covered by its records and/or of the time period for which any persons with knowledge regarding the Site recall responsive information.

BPACC also reasserts its prior objections to Request Instructions Nos. 4 and No. 5 and Definition No. 2 as unduly burdensome and as more fully explained in BPACC's May 9, 2007 response.

To supplement the May 9, 2007 response, Enclosed is a November 30, 2006 Workplan for Additional Site Assessment prepared by SECOR International Incorporated ("SECOR Workplan") [BPACC01622 to BPACC01800]. The SECOR Workplan compiles historical assessment information in connection with the Site. As a further supplement, enclosed is a May 29, 1990 Engineering Enterprises, Inc. ("EEI") Report of Additional Subsurface Assessment and Groundwater Sampling [BPACC01801 to BPACC01834] and an August 21, 1987 letter from W. T. Kerr to C.F. Kirby entitled Torrance Plant Monomer Spill which describes an August 12, 1987 spill of styrene at the Site [BPACC01835 to BPACC01836]. Much of the information contained in these documents was set forth in other documents provided in BPACC's May 9, 2007 response.

Further, as a point of clarification, to the extent certain BPACC initial responses to individual questions set forth in the Request read, "BPACC was unable to locate any documents or information responsive to this request," this statement should read, "Except as set forth in documents or information produced by BPACC in response to other requests, BPACC was unable to locate any documents or information responsive to this Request."

As set forth in the May 9, 2007 response, BPACC reserves its right to supplement or amend the initial response and this supplemental response should additional information become available. If you have any further questions or comments regarding the above or enclosed, please contact Michael A. Francis or me.

Very truly yours,

Brian D. Langa

BDL/blt
Enclosures

Work Plan for Additional Site Assessment

American Polystyrene Corporation Facility
1225 West 196th Street, Torrance, California

November 30, 2006

PREPARED FOR:

American Polystyrene Corporation
1225 West 196th Street,
Torrance, California

and

Atlantic Richfield Company
6 Centerpointe Drive
La Palma, California 90623

PREPARED BY:

SECOR International Incorporated
290 Conejo Ridge Avenue
Thousand Oaks, CA 91361

805-230-1266 tel
805-230-1277 fax

SECOR

SECOR INTERNATIONAL INCORPORATED
www.secor.com
290 Conejo Ridge Avenue, Suite 200
Thousand Oaks, CA 91361
805 -230 -1266 TEL / 805 -230 -1277 FAX

letter of transmittal

attention: Ms. Ana Townsend date: December 8, 2006

company: **Los Angeles RWQCB**

address: 320 West 4th Street, Suite 200
Los Angeles, CA 90013-2343

project: Amer. Polystyrene Corp, Torrance, CA

job no.: 37BP.XB010.03

re: **Work Plan for Assessment**

enclosed:

( )	Proposal	( )	Per Consent Decree
( )	Contract	(X)	Review
( )	Report	( )	Your Information
( )	Letter	( )	Approval
(X)	Other: Work Plan	( )	Signature
		( )	Return
		( )	Other:

comments: Copy of the following Work Plan:

- *Work Plan for Additional Site Assessment* – 1225 West 196th St. – Torrance, CA, November 30, 2005 (RWQCB SLIC Site No. **214**)

signature: Philip Kinney
title: Principal Geologist

cc: Kyle Christie, Atlantic Richfield Co. (1 Copy)
Carl Benninger, American Polystyrene Corp. (2 Copies)

SECOR

290 Conejo Ridge Avenue
Thousand Oaks, CA 91651
805-230-1266 TEL
805-230-1277 FAX

November 30, 2006

Ms. Ana Townsend
California Regional Water Quality Control Board
Los Angeles Region
320 West 4th Street, Suite 200
Los Angeles, CA 90013

RE: WORKPLAN FOR ADDITIONAL SITE ASSESSMENT
American Polystyrene Corporation Facility
1225 West 196th Street
Torrance, California
CRWQCB-LAR I.D. - SLIC NO. 214

Dear Ms. Townsend:

SECOR International Incorporated (SECOR), on behalf of American Polystyrene Corporation (APC) and the Atlantic Richfield Company (Atlantic Richfield) a subsidiary of BP, submits this workplan proposing additional on-site assessment at APC's facility (the Site), located at 1225 West 196th Street in Torrance, California (Figures 1 and 2). This workplan for additional site assessment was prepared is in response to the California Regional Water Quality Control Board, Los Angeles Region (CRWQCB) request for assessment dated March 1, 2006 and an extension for work plan completion granted in correspondence dated July 5, 2006 (Attachment A).

Per the correspondence, the CRWQCB is seeking vertical and horizontal definition of volatile organic compounds (VOCs) related to the site. Because a Site-specific source has not been identified and confirmed, and because numerous off-Site sources exist on adjacent properties and in the surrounding area, the proposed assessment is designed to characterize the on-Site conditions at the APC facility. The scope of work focuses on completing on-Site assessment of the APC facility, evaluating potential on-Site sources of previously detected compounds, and evaluating the impact from known off-Site releases at the property. The objectives of the additional on-Site assessment are to:

- Evaluate the Site for potential on-site source areas including a former dry well and existing chemical handling and storage areas based on site operations;
- Evaluate the potential for off-site sources immediately to the north and east to impact the Site; and
- Conduct on-Site characterization of groundwater on the southwestern portion of the Site.

In order to complete these objectives, SECOR proposes the following scope of work:

- Conduct a geophysical ground penetrating radar (GPR) survey west of the warehouse where drilling cannot be conducted to attempt to identify the location of a former dry well;
- Install 17 temporary direct-push soil vapor survey (SVS) borings with soil vapor samples collected at a depth of approximately 20 and 30 feet below ground surface (bgs);
- Install seven continuously cored direct-push soil borings to a depth of approximately 65 feet bgs with soil samples collected at five foot intervals;
- Obtain a well installation permit from the Los Angeles County Department of Health Services (LADHS);
- Install one additional groundwater monitoring well (XOW-07) to a depth of approximately 85 feet bgs using a hollow-stem auger drill rig at the southwestern corner of the Site;
- Develop newly installed groundwater monitoring well XOW-7;
- Generate a technical report summarizing the findings of the on-Site investigation and off-Site data.

SITE INFORMATION

The Site is located east of the intersection of Normandie Avenue and West 196th Street in the City of Torrance at an elevation of approximately 44 feet above mean sea level (amsl). The current APC plant is located on two parcels of approximately 2.1 total acres and consists of offices, a small laboratory, an 18,000 square foot warehouse, up to 30 aboveground storage tanks (ASTs) and silos for the storage of liquids and solid, a batch plant processing area, a railroad spur, aboveground water recycling and cooling tower equipment, and maintenance and storage buildings. There is no history of underground storage tanks (USTs) at the Site and all piping appears to be aboveground except for the sanitary sewer line. A septic tank may have operated on Site prior to 1969.

The production of polystyrene resin from styrene monomer has been the primary activity at the Site since development of the property. Aerial photographs indicate the Site was use for agriculture or was vacant up to at least 1956 (Fairchild Collection aerial photograph, 1956). The original polystyrene plant was built on the western parcel by Brand Plastics Company in 1962. Amoco Chemical Company (Amoco) acquired the property in 1964 and operated the facility until May 1993, when APC purchase the property and the plant. BP acquired Amoco Oil Company and subsidiary companies in 1998 and has never been actively involved in facility operations. The Atlantic Richfield Company (a subsidiary of BP) is the remediation company for BP in the United States.

The APC Facility is located in an area with a history of heavy industrial land use since 1940's. Four of the larger historical operations know in the area are listed here.

East of the Site: The Del Amo superfund site is located directly east and adjacent to the Site. This large facility of originally over 280 acres was built to provide synthetic rubber during World War II and was dismantled in the 1970's. Approximately a third of the Del Amo facility produced polystyrene before the Brand/Amoco/APC site began production starting in the 1960's. The PRP for the Del Amo remediation is Shell Oil Company under the oversight of the USEPA. Figures produced for the Del Amo superfund site and air photos show former "pits" immediately east of APC and indicate potential PCE/TCE impacts (Figure 2).

West of the Site: A former McDonnell Douglas manufacturing plant was located west of the Site. The plant operated from the 1940's through 1990's. This large facility has known groundwater impacts which include chlorinated solvents in groundwater.

North of the Site: The ECI property at 19500 S. Normandie Avenue, located up-gradient and directly adjacent to the northern property boundary of APC, was a former paint manufacture. Reclaimed solvent wastes were reportedly stored in three 5,000 gallon USTs and Methylene chloride was also stored on the property.

South of the Site: Properties to the south of APC at 1206 W. 196th Street and 19706 S. Normandie Avenue have also been identified as having a history of chlorinate storage and handling with possible releases to the subsurface.

FACILITY OPERATIONS

Past and current facility operations, styrene monomer is mixed with small amounts of other raw materials in batch tanks located in the northern secondary containment area. Additives in the current processes include mineral oil, zinc stearate, acrawax, dyes, and anti-oxidants (APC, 2006). The batch is then sent to one of two production lines for the polymerization heating and reaction process.

The polystyrene production process includes the use of water to cool polymer that emerges at the end of the process in a water bath. Documents indicate that from 1962 to 1969 the excess water was disposed of in a 35 foot "dry well". No documents or physical evidence have been found to indicate the well's location (EEI, 1986).

In about 1969, the cooling water process was diverted to the sanitary sewer and the dry well was reportedly "filled and blacktopped". In 1973, the County Sanitation District refused further discharge of the "clean water" to the sewer (EEI, 1986). Alternatives for the disposal of excess cooling water included installing a new dry well for injection or installing a recirculation and cooling tower system. The plant operator selected and installed the closed-loop recirculation system and the second dry well was not installed.

PREVIOUS ASSESSMENTS

Voluntary assessment has been conducted on the Site beginning with Amoco in approximately 1986 to 1988 when groundwater quality investigations were initiated. The following assessment and remediation history is compiled from documents available at the time this workplan was prepared.

- In 1986, a voluntary groundwater quality investigation was proposed per Amoco's internal correspondence (Amoco, 1986) and was described in later correspondence to the CRWQCB and the USEPA. (Amoco, 1992a, b)

- On August 12, 1987, 205 gallons of styrene monomer was spilled in the northern secondary containment area. Most of the spill was recovered and properly disposed off-Site. (Amoco, 1987)

- In 1988, Reidel Environmental Services Inc. reportedly finds Styrene and chlorinated compounds during preliminary assessment of their property at 19500 Normandie (current ECI property located directly north of the Site) and reports results to Amoco.

- Between 1986 and 1988, Amoco installed six on-Site groundwater monitoring wells (XOW-01 through XOW-06) as part of a company-wide policy to monitor groundwater at chemical facilities. No report of the well installation, boring logs, or associated analytical sampling of soil or groundwater sampling has been found for review. Other correspondence indicates that no VOCs were detected during the initial sampling event and that groundwater was encountered between 69 and 73 feet bgs. (Amoco, 1992b)

- In October 1988, Amoco contracted EEI to collect and analyze four soil samples from five hand-auger borings (B-1 to B-5) each advanced to five feet bgs within the northern (3 borings) and eastern (2 borings) secondary-containment areas. Tetrachloroethene (PCE) and ethylbenzene were detected at the one foot depth in the eastern secondary-containment area. Styrene and ethylbenzene were detected in three samples from the northern secondary-containment area (EEI, 1988). Selected figures and tables summarizing historical soil sampling are included in Attachment B.

- In June 1989, Amoco contracted ENSR to drill 14 additional soil borings (B-6 to B-19) to total depths of 20 feet bgs in the two containment/tank farm areas to evaluate the vertical extent of VOCs in soil (Amoco, 1992b). Styrene, ethylbenzene, and a trace of trichloroethene (TCE) were detected beneath the eastern secondary-containment area in soil borings B-14 and B-6. Styrene, ethylbenzene, TCE, and PCE were detected beneath the northern secondary-containment area in soil borings B-10 and B-18. Selected figures and tables summarizing historical soil sampling are included in Attachment B.

- In 1989, Amoco rebuilt the secondary-containment areas at two AST locations. The containments were reconstructed with concrete floors and walls. Approximately 200 tons of soil was excavated for construction purposes and transported to USPCI waste disposal facility at Grassy Mountain, Utah. (Amoco, 1992a)

- In February 1990, Amoco contracted EEI to drill 2 additional soil borings (B-20 to B-21) to 40 feet bgs, one at each containment area to evaluate the vertical extent of VOCs in soil adjacent to B-14 in the eastern containment and B-18 in the northern containment (EEI, 1990). [Please note: these borings are designated as B-1 and B-2 in the original EEI report, as EEI-1 and B-2 in the EEI boring logs, and later as B-20 and B-21 in the Amoco summary tables and figures]

- In February 1990, EEI also conducted two rounds of groundwater sampling from the existing wells on February 1, 1990 and February 21, 1990. Groundwater was gauged at 63 to 66 feet bgs (EEI, 1990). Figures and tables summarizing historical groundwater sampling are included in Attachment C.

- In December 1990 and June 1991, two additional groundwater monitoring events were performed. The VOC results were summarized by Amoco in later correspondence to regulatory agencies, but the data report is missing.

- On January 16, 1992, Amoco contracted Simon Hydro-Search (Simon) to conduct groundwater sampling of the existing six monitoring wells for VOC and semi-VOC analyses. 1,2-dichlorobenzene was the only semi-volatile compound reported. The concentration was reported at 5 µg/l in monitoring well OW-6 (Simon, 1992). Periodic groundwater monitoring stopped after this event and Amoco sold the facility to APC in 1993.

- In December 2003, the CRWQCB issued an Order requiring quarterly groundwater monitoring from the six existing monitoring wells.

- In first quarter 2006 (1Q-2006), groundwater monitoring wells located on the APC property were sampled through a USEPA by agreement with Shell Oil Company, through its consultant URS. The APC wells were sample as part of a USEPA coordinated effort to sample third-party monitoring wells in the vicinity of the Del Amo/Montrose superfund sites.

- From 3Q-2004 to 1Q-2006, APC contracted Winefield & Associates, Inc. (Winefield) to conduct quarterly groundwater monitoring and sampling for the existing six monitoring wells. Winefield sampled the Site for VOCs and selected metals Pb, Cu, Hg, Cr-total, and Cr-6 that may be associated with cooling waters.

SUBSURFACE CONDITIONS and POTENTIAL CHEMICALS OF CONCERN

The only boring logs available at the time of this workplan are for soil borings B-20 and B-21, both completed to approximately 40 feet bgs (Attachment D). Soil types encountered during installation of those borings were noted as follows: 1) clay from surface grade to approximately 17 feet bgs; 2) sand and silty sand from approximately 17 to 20 feet bgs; 3) interbedded sand, silty sand, silty clay, and clayey silt from approximately 20 to 33 feet bgs; 4) silt from approximately 33 to 39 feet bgs; and 5) sand or silty sand from approximately 39 to 40 feet bgs (maximum depth explored). Chemical compounds previously detected in shallow soil (1'-20' bgs) beneath the secondary containment areas were ethylbenzene, styrene, toluene, PCE, and TCE. In deeper soil

samples (30'-40' bgs), beneath the northern secondary containment area, PCE, TCE, benzene, 111-trichloroethane (TCA), and carbon disulfide were detected in varying concentrations (Attachment B).

Groundwater beneath the Site recently (Q4-2005) ranged in depth from approximately 55 to 58 feet bgs. During groundwater monitoring and sampling in February 1990, depth to groundwater ranged from approximately 64 to 66.5 feet bgs, indicating that groundwater beneath the Site has risen by up to nine feet since 1990. The groundwater gradient direction has ranged from southeast to south-southwest at an approximate gradient of 0.0015 feet per foot. Chemical compounds detected in groundwater are of greater variety and concentration than the compounds previously detected in overlying soil. These chemicals include methylene chloride, PCE, TCE, toluene, benzene, ethylbenzene, TCA, 1,1-DCE, 1,2-DCE, chlorobenzene, and chloroform. See Attachment C for all detected compounds and concentrations.

PRE-FIELD ACTIVITIES

All field activities will be completed with safety as a foremost concern. A Site specific Health and Safety Plan (HASP) has been for this project. All SECOR personnel, as well as any other on-Site subcontractors or regulatory personnel, will be required to familiarize themselves with and sign the HASP in an attempt to minimize safety hazards.

Prior to drilling at the Site, the following notifications and arrangements will be completed:

- Submit this Workplan with attached HASP to the LARWQCB for review;
- Utilize Underground Service Alert and a private geophysical underground utility location service to locate and surface mark all subsurface utilities and obstructions at and around the proposed boring locations prior to drilling; and
- Notify the LARWQCB, American Polystyrene, and Atlantic Richfield representatives at least ten days prior to initiating any fieldwork.

FIELD INVESTIGATION

All work will be performed under the direct supervision of a State of California Professional Geologist. Drilling, soil and vapor sampling protocols, laboratory analytical testing, chain-of-custody procedures, QA/QC protocols, and decontamination activities will be completed in accordance with the Standard Operating Procedures (SOP) included in Attachment E. Health and safety monitoring activities are described in the Site-specific HASP included in Attachment F.

Ground Penetrating Radar Investigation

SECOR proposes to conduct a geophysical investigation using GPR in the batch processing area located east of the warehouse/production area. The purpose of the GPR

survey is to identify possible anomalies that may identify the former dry well location. Because of the tight space and low overhead in the batch processing area, no drilling is proposed in this area. Since piping at the plant is predominantly routed above ground, subsurface anomalies may be apparent. The proposed area for the survey is indicated by the hatching on Figure 3, but may vary based on accessibility throughout the processing area and not follow a regular grid pattern.

Soil Vapor Survey

SECOR proposes installation of approximately 17 soil vapor survey (SVS) locations for the collection of soil vapor samples at approximately 20 and 30 feet bgs (Figure 3). The objective of the SVS is to locate and evaluate potential source areas on the Site and off-Site to the north and west. The data is not intended to be used for indoor air quality evaluation at this time.

The sample locations were selected based on a loose grid pattern of approximately 50 feet and to best locate and evaluate potential on-site and off-site source areas. On-site sources would primarily be the unknown location of the former 35 foot depth dry well and to a lesser extent the ongoing storage and processing of the facility such as the tank containment areas, cooling tower area, and the batch plant processing area. Potential off-site source areas are located to the north (former paint manufacturer / now ECI) and to the east (possible trenches on the Del Amo facility).

Sample depths are based primarily on the limited available subsurface lithological information from boring logs B-20 and B-21 and the reported total depth of the dry well to 35 feet bgs. The boring logs indicated that permeable horizons (sand and silty sand), conducive to vapor sample collection, exist at depths of approximately 17-22 and 28-33 feet bgs.

The following describes the proposed workscope for performing an active soil vapor investigation at the Site. The proposed active soil vapor investigation follows guidelines found in the DTSC's January 28, 2003 *"Advisory: Soil Gas Investigations"* and the February 25, 1997 *"Interim Guidance for Active Soil Gas Investigations"* prepared by the California Regional Water Quality Control Board, Los Angeles Region.

The following methods will be employed during the performance of the soil vapor survey:

- A direct-push hydraulic ram (Geoprobe) equipped with hollow drive rods will be used to advance the vapor survey point to the desired depth.

- After placement of the temporary soil vapor survey points and a sand pack, hydrated bentonite chips or pellets will be placed around each probe and associated sample tubing to prevent ambient air intrusion from occurring;

- At each sampling location, samples will be obtained after approximately 20 minutes following installation to allow subsurface conditions to approach steady state equilibrium;

- A purge volume test will be conducted following guidelines to determine the appropriate purge volume for soil gas sample collection. A single purge test will be performed with the collection of sample volumes at 1, 3 and 7 times the volume of sample tubing and probe annular space. The remaining soil gas survey points will then be purged using the purge volume obtained from this test with the highest VOC concentrations. If the analyzed soil gas from the purge volume test is non detect, then the default three-volume purge rate will be used;

- A leak test of the bentonite seal will be conducted at each soil gas survey point using isobutylene or other suitable volatile compounds;

- Purging and sampling will be conducted at a rate between 100 to 200 milliliters per minute. At each location/target depth, the appropriate number of calculated "dead space" vapor-probe volumes (depending on the results of the purge volume test) of soil gas will be purged, and a soil vapor aliquot contained in an appropriate sample container will be extracted from the point and transported to an on-site mobile laboratory for chemical analysis;

- Soil gas samples for laboratory analyses of volatile organic compounds (VOCs) by EPA Method 8260B will be collected using syringes, and all appropriate chain-of-custody and sample handling protocols will be followed;

- At an approximate 10% level of effort, soil gas sample locations and depths that are found to contain VOC concentrations that are less than the detection limit for a particular COC analyte by USEPA Method 8260B, will be re-sampled with an additional soil gas sample using a laboratory-certified clean micro-Summa™ canister, and will be analyzed using Method TO15 to extend the lower detection range;

- Appropriate QA/QC samples will be collected and analyzed as outlined in the guidance document. One duplicate soil gas sample will be collected per day for QA/QC purposes; and

- Soil gas probes will be removed and properly disposed of once sampling is completed, and the borehole will be properly backfilled with bentonite grout.

Soil Boring Installation

SECOR proposes installation of approximately seven soil borings to a depth of approximately 65 feet bgs (approximately five feet below expected top of the saturated zone) at various locations on site. The purpose of the soil borings is to confirm and/or further assess potential source areas based on the SVS results, and to complete vertical delineation within the unsaturated zone adjacent to the two AST secondary containment areas where shallow soil was assessed in previous borings (B-1 to B-21). The deepest soil samples collected from historical soil borings is to 40 feet bgs in two of the 21 borings (one at each AST containment area). At this time, no soil analytical data or boring logs have been identified for the existing groundwater monitoring wells (XOW-01 through XOW-06) drilled to approximately 85 feet bgs.

The soil borings will be advanced utilizing a direct-push (Geoprobe) rig. All soil borings will be continuously cored to total depth for detailed lithologic logging, and to document any possible confining layers or areas of visible staining. Soil samples will be collected at five-foot intervals for subsequent laboratory analyses using an EPA Method 5035 approved sampling device (EnCore™). Soil samples will be visually classified in accordance with the Unified Soil Classification System. In addition, soils will be monitored for volatile organic vapors by the headspace method using a hand-held photo-ionization detector (PID) or equivalent. Soil sampling will be conducted in accordance with SECOR's Standard Operating Procedures (SOPs) for soil sampling included in Attachment E.

Upon completion, soil borings will be backfilled to near surface grade with hydrated bentonite chips and sealed at the surface with concrete dyed to match the existing surface grade.

Groundwater Monitoring Well Installation

One additional groundwater monitoring wells (XOW-07) will be installed to a total depth of approximately 80 to 85 feet bgs using a hollow-stem auger drill rig. The purpose of this well is to provide additional delineation of VOCs in the southwestern corner of the site, and to investigate potential off-Site sources.

Well XOW-07 will be constructed using two-inch diameter Schedule 40 poly-vinyl chloride (PVC) casing, with a screened interval (0.020-inch slot) extending from approximately 50 to 80 feet bgs. The well annulus will be backfilled with #2/12 Monterey sand to approximately two feet above the screened interval, and then capped with approximately three feet of hydrated bentonite chips. Prior to setting the seal, the well will be surged and bailed to settle the sandpack and remove fines from the well. The wellheads will be completed using 12-inch diameter EMCO-Wheaton well boxes set in concrete flush with the existing surface.

Soil samples will be collected at five-foot intervals for subsequent laboratory analyses using an EPA Method 5035 approved sampling device (EnCore™). Soil samples will be visually classified in accordance with the Unified Soil Classification System. In addition, soils will be monitored for volatile organic vapors by the headspace method using a hand-held photo-ionization detector (PID) or equivalent. Soil sampling will be conducted in accordance with SECOR's SOP for soil sampling included in Attachment E.

LABORATORY ANALYSIS

Soil samples will be analyzed by a fixed California Certified Environmental Laboratory for VOCs in accordance with EPA Method 8260B. Soil samples from soil borings will be analyzed at five foot intervals.

Soil vapor samples will be analyzed by a mobile California Certified Environmental Laboratory for VOCs in accordance with EPA Method 8260B and 10% of vapor samples by Method TO-15 (see above).

WELL DEVELOPMENT

No sooner than 72 hours after installation of the groundwater monitoring well, well development will be conducted using a specific well development rig equipped with a surge block. Development of the well will involve both surging and bailing.

At regular intervals, the dissolved oxygen, redox potential, turbidity, temperature, pH, and specific conductivity of the purge water will be measured using a meter or meters. Stabilization parameters will be recorded on a SECOR Well Development Data Sheet. SECOR personnel will continue to develop the well until one of the two following conditions are met:

- Three to five well-casing volumes of purge water are removed and dissolved oxygen, redox potential, turbidity, temperature, pH, and specific conductivity are stabilized, or

- Recharge of the well is not sufficient to sustain the purging process.

An expanding cap with lock will be installed on the well, and the well box lid will be secured. Purge and decontamination water will be contained in Department of Transportation (DOT) approved 55-gallon drums. The drums will be temporarily stored on site pending disposal.

WASTE DIPOSAL

Any soil and decontamination water will be contained in properly labeled, Department of Transportation approved open head 55-gallon drums with locking covers, and stored on site. Samples of drummed materials may be collected and analyzed for waste characterization purposes, if necessary. After receipt of any analytical results, the drums will be transported off-site. The disposal site for the drums will be determined based on laboratory results. Waste disposal documents will be provided with the site assessment report. All waste will be properly disposed/recycled in accordance with all applicable Federal, State, and local regulations.

WELL SURVEYING

The newly installed groundwater monitoring well will be professionally surveyed relative to a City of Los Angeles Benchmark by a licensed surveyor. The wellhead casing elevations will be surveyed to the nearest 0.01 foot. The top of the well casing will be notched and permanently marked with the survey point upon which subsequent water measurements will be obtained. The licensed surveyor will measure the longitude and latitude measurements with a Global Positioning Satellite (GPS) Instrument in accordance with Assembly Bill 2886.

GROUNDWATER SAMPLING

Well surveying and groundwater sampling will be coordinated with APC's groundwater consultant, Winefield and Associates, Inc.

PROJECT REPORTING

A technical report will document the methods used during this investigation. Analytical data will be presented in tabular format and annotated on the appropriate Figures. Figures will include a Site map showing soil boring, soil vapor survey, and monitoring well locations, VOC concentration map, and boring logs. The report will contain all pertinent documentation such as permits, laboratory reports, disposal/recycling manifests, and chain of custody forms. The final report will be reviewed in its entirety and signed by a State of California Professional Geologist.

STANDARD LIMITATIONS

This workplan has been prepared as a guidance document for the planned field activities. Field conditions may necessitate modifications to the workplan. Should any modifications be necessary, the changes will be documented in the field records and the LARWQCB will be notified.

All work will be performed under the supervision of a Professional Geologist as defined in the Registered Geologist Act of the California Code of Regulations. The information contained in this report represents SECOR's professional opinions, and is based in part on information supplied by the client. These opinions are based on currently available information and are arrived at in accordance with currently accepted hydrogeologic and engineering practices at this time and location. Other than this, no warranty is implied or intended.

If you have any questions regarding this Site or workplan, please do not hesitate to contact the undersigned at (805) 230-1266.

Sincerely,

SECOR International Incorporated

Prepared By:

Gareth Roberts, P.G.
Senior Geologist

REGISTERED GEOLOGIST
PHILIP R. KINNEY
No. 4856
STATE OF CALIFORNIA

Reviewed By:

Philip R. Kinney, P.G.
Principal Geologist

Appendices: Figure 1 – Site Location Map
Figure 2 – Site Vicinity Map
Figure 3 – Site Map Showing Proposed and Existing Soil Boring and Well Locations

Attachment A – Regulatory Agency Correspondence
Attachment B – Historical Soil Sampling Locations and Analytical Results
Attachment C – Historical Groundwater Sampling and Analytical Results
Attachment D – Historical Boring Logs
Attachment E – Standard Operating Procedures for Soil and Groundwater Sampling
Attachment F – Site Specific Health and Safety Plan

cc: Mr. Kyle A. Christie - Atlantic Richfield Company
Mr. Carl G. Benninger – American Polystyrene Corporation

REFERENCES

American Polystyrene Corporation, 2006, Communication with Carl Benninger, APC Operations/Technical Manager.

Amoco Chemical Company, 1986, Internal Correspondence GMS 86-455, RE: Proposal to Install and Upgrade Groundwater Monitoring Systems at Amoco Chemical's Plants, Torrance, California. June 16.

Amoco Chemical Company, 1987, Internal Correspondence, RE: Torrance Plant Monomer Spill, Torrance, California. August 21.

Amoco Chemical Company, 1992a, Correspondence to U.S.EPA Region IX, RE: Del Amo Superfund Site, Torrance, California. August 27.

Amoco Chemical Company, 1992b, Correspondence to CRWQCB-LAR, RE: Notification of Groundwater Contamination, Torrance, California. August 27.

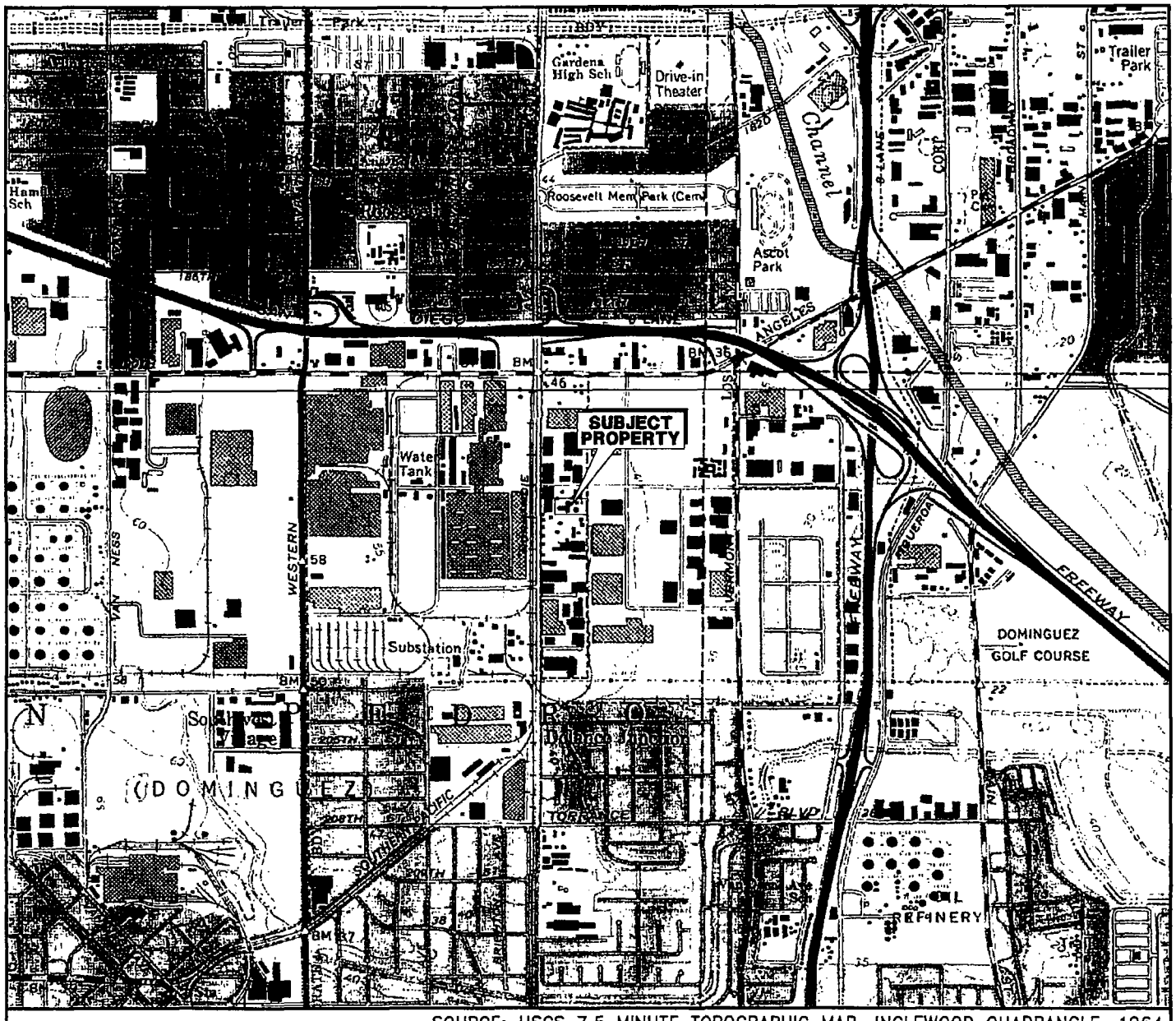
Engineering Enterprises, Inc. (EEI), 1988, Report of Shallow Soil Sampling, Amoco Chemical Facility, Torrance, California. November.

Engineering Enterprises, Inc. (EEI), 1990, Report of Additional Subsurface Assessment and Groundwater Sampling, Amoco Chemical Facility, Torrance, California. May

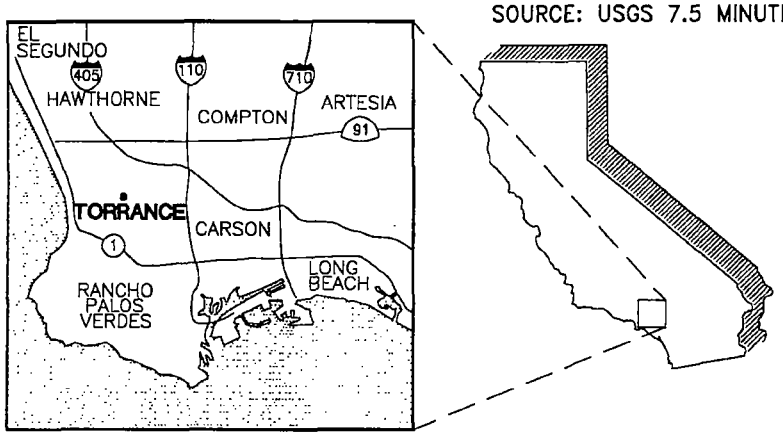
Simon Hydro-Search, 1992, January 1992 Groundwater Sampling and Analysis Report, Amoco Chemical Facility, Torrance, California. March 11

Winefield & Associates, Inc., 2006, 4th Quarter 2005, Groundwater Monitoring and Status Report, Amoco Chemical Facility, Torrance, California. January 17.

FIGURES



SOURCE: USGS 7.5 MINUTE TOPOGRAPHIC MAP, INGLEWOOD QUADRANGLE, 1964
PHOTOREVISED 1981
TORRANCE QUADRANGLE, 1964
PHOTOREVISED 1981



N

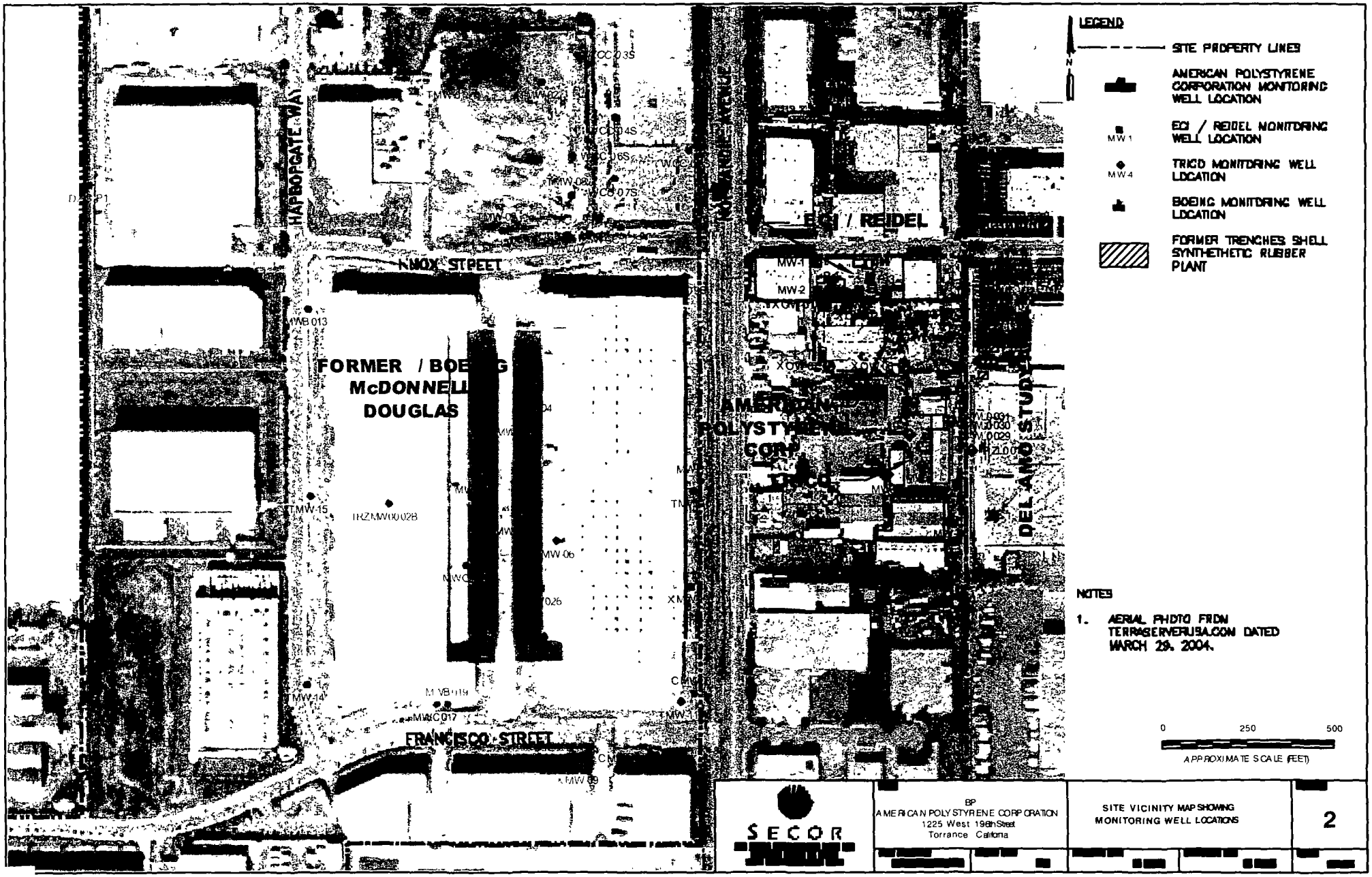
0 2000 4000

APPROXIMATE SCALE (FEET)

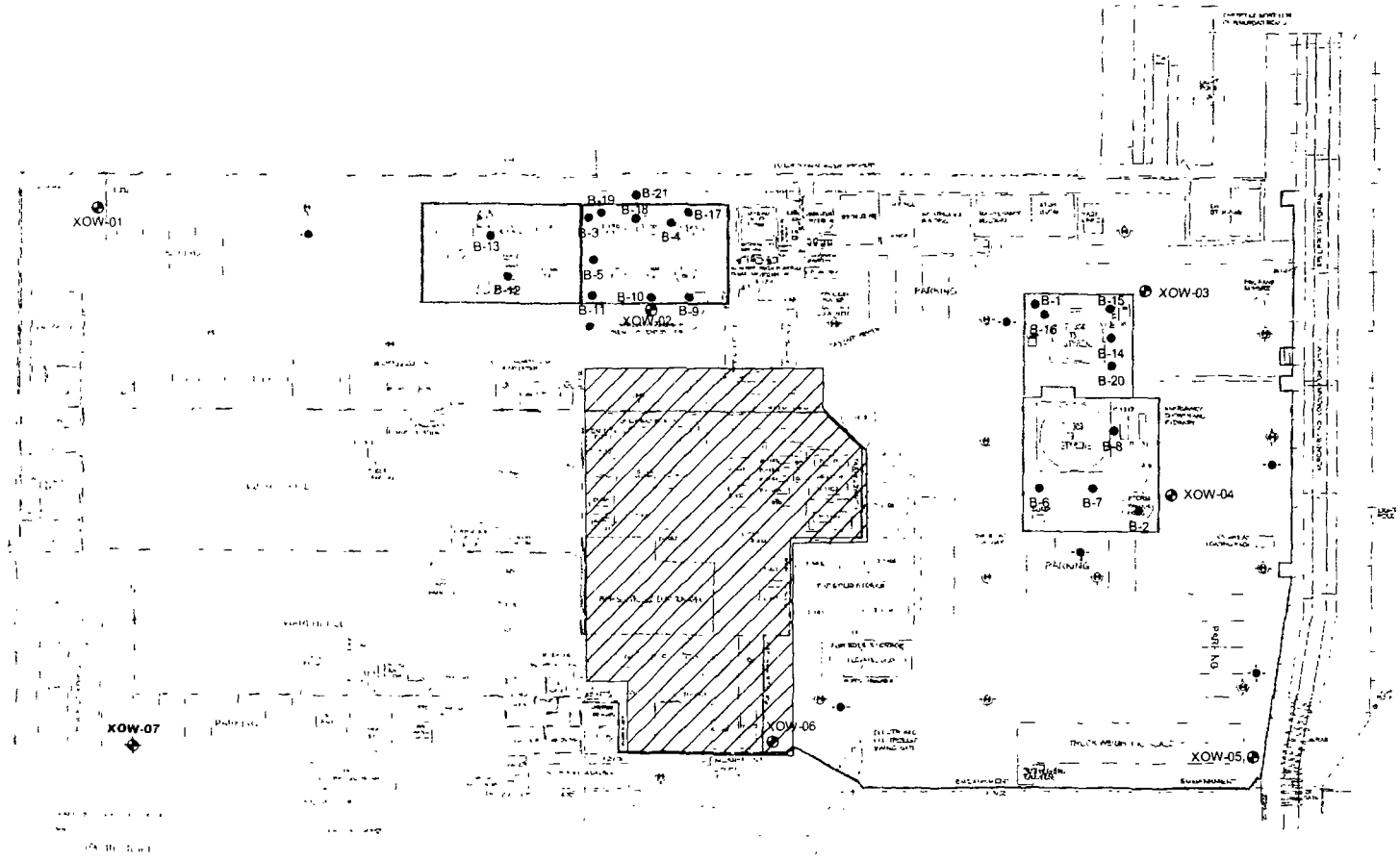
SECOR 290 Conejo Ridge Avenue, Suite 200 Thousand Oaks, CA 91361 (805) 230-1266/230-1277 (Fax)	FOR: BP AMERICAN POLYSTYRENE CORPORATION 1225 West 196th Street Torrance, California		**SITE LOCATION MAP**		FIGURE: **1**
	JOB NUMBER: 37BP.XB010.03/1136	DRAWN BY: RLE	CHECKED BY: P. Kinney	APPROVED BY. P. Kinney	DATE: 08/17/06

FILEPATH:Q:\CADD-37\Client\BP_and_OBC\OBC_and_Misc\American_Polystyrene_Corp\SLM-CLR\BP_APC-SLM.dwg | rerdman | Aug 18, 2006 at 8:05 | Layout: SLM

BPACC01638


HAPBOPGATE WAY
KNOX STREET
FRANCISCO STREET
DELANO STREET
FORMER / BOEING
McDONNELL
DOUGLAS
ECI / REIDEL
AMERICAN
POLYSTYRENE
CORP
TMW-15
TRZNMW0002B
MW-06
MW-14
MW-1
MW-2
MW-4
LEGEND
SITE PROPERTY LINES
AMERICAN POLYSTYRENE CORPORATION MONITORING WELL LOCATION
ECI / REIDEL MONITORING WELL LOCATION
TRICO MONITORING WELL LOCATION
BOEING MONITORING WELL LOCATION
FORMER TRENCHES SHELL SYNTHETHETIC RUBBER PLANT
N
NOTES
1. AERIAL PHOTO FROM TERRASERVERUSA.COM DATED MARCH 29, 2004.
0
250
500
APPROXIMATE SCALE (FEET)
SECOR
BP
AMERICAN POLYSTYRENE CORPORATION
1225 West 190th Street
Torrance California
SITE VICINITY MAP SHOWING MONITORING WELL LOCATIONS
2

BP/



LEGEND

- XOW-01 — GROUNDWATER MONITORING WELL LOCATION
- B-1 — PREVIOUS SOIL BORING LOCATION
- PROPOSED SOIL VAPOR SURVEY BORING LOCATIONS
- XOW-07 — PROPOSED GROUNDWATER MONITORING WELL LOCATION
- PROPOSED SOIL BORING LOCATION
- PROPOSED GROUND PENETRATING RADAR SURVEY AREA

N

NOTES

1 DRAWING FROM AMERICAN POLYSTYRENE CORPORATION DRAWING #250-TO-D NOT DATED

0 40 80

APPROXIMATE SCALE (FEET)

SECOR
290 Conejo Ridge Avenue Suite 200
Thousand Oaks CA 91361
(805) 230 1266/230 1277 (Fax)

FOR
BP
AMERICAN POLYSTYRENE CORPORATION
1225 West 190th Street
Torrance, California

SITE MAP SHOWING EXISTING AND PROPOSED SOIL BORING AND WELL LOCATIONS

FIGURE **3**

JOB NUMBER	DRAWN BY	CHECKED BY	APPROVED BY	DATE
37BP X8010 03/1136	RLE	P Kinney	P Kinney	08/17/06

BPACC01

ATTACHMENT A

Regulatory Agency Correspondence

American Polystyrene Corporation Facility
1225 West 196th Street
Torrance, California
SECOR Project No. 37BP.XB010.03

California Regional Water Quality Control Board

Los Angeles Region

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

Alan C. Lloyd, Ph.D.
Agency Secretary

320 W. 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

Arnold Schwarzenegger
Governor

March 1, 2006

Mr. Michael A. McAnulty
Environmental Business Manager
Atlantic Richfield Company
6 Centerpointe Drive
La Palma, CA 90623

Mr. Carl Benninger
American Polystyrene
1225 West 196th Street
Torrance, CA 90502

CALIFORNIA WATER CODE SECTION 13267 ORDER FOR SUBSURFACE INVESTIGATION OF UNAUTHORIZED DISCHARGES AT FORMER AMOCO CHEMICAL COMPANY POLYSTYRENE FACILITY, 1225 WEST 196TH STREET, TORRANCE (SLIC NO. 214)

Dear Mr. McAnulty and Mr. Benninger:

Our previous letters dated February 19, 2004, and December 12, 2003, required Amoco (now British Petroleum (BP) Amoco and Atlantic Richfield Company (herein referred to "Amoco")) and American Polystyrene Corporation (APC) to submit information regarding chemical use, storage and disposal practices and to conduct quarterly groundwater monitoring at the facility located at 1225 West 196th Street, Torrance, California (Facility). Groundwater monitoring has been conducted and quarterly reports submit to this Regional Board by APC since 2004.

Regional Board staff have reviewed the information provided by Amoco and APC and have determined that the previous chemical use, storage and/or disposal practices at this Facility have polluted the underlying soil and groundwater. Volatile organic compounds (VOCs) are present in the groundwater beneath the Facility at concentrations above their respective maximum contaminant levels (MCLs) established by the California Department of Health Services and have degraded the beneficial uses of the State's groundwater resources.

To determine the extent of soil and groundwater pollution, Amoco and APC are required to conduct an additional extensive soil, soil vapor and groundwater investigation at the subject site. Amoco and APC are required to develop and submit a work plan presenting the rationale and methodology for determining the vertical and lateral extent of known soil and groundwater pollution underlying the site by **June 30, 2006**. The work plan must incorporate all applicable requirements contained in the enclosed Requirements for Subsurface Soil Investigation, Requirements for Groundwater Investigations, Laboratory Requirements for Soil and Water Sample Analyses, and Advisory Active Soil Gas Investigation.

Amoco and APC are also required to investigate area of suspected soil contamination, based in part on current and previous operations at the site. At a minimum, the Work Plan shall include:

1. Proposed locations for additional soil borings to further define the extent of soil pollution identified underlying the subject site. Proposed boring locations, boring depth and sampling frequency shall be based in part on past site operations.

2. Proposed locations for additional groundwater monitoring wells (onsite and offsite) to determine the full vertical and lateral extent of groundwater pollution.

3. Information submitted by Amoco documents disposal of wastes into at least one on-site dry/injection well, and a proposal for installation of a second dry/injection well. The required work plan shall present a detailed proposal for the identification of the location, construction and integrity of these disposal wells, and detailed plans for the installation of groundwater monitoring wells to determine the vertical and lateral extent of contamination associated from the operation of these wells.

Existing groundwater monitoring wells must continue to be sampled quarterly and quarterly groundwater monitoring reports submitted as specified in following schedule:

Reporting Period	Sampling Month	Report Due Date
January – March	January	April 29
April – June	April	July 2
July – September	July	October 31
October – December	October	January 31

As additional groundwater monitoring wells are installed at the subject site they must also be incorporated into the above referenced schedule. Pursuant to Section 13268 of the California Water Code, failure to submit the required reports or documents by the due dates may result in civil liability administratively imposed by the Regional Board in an amount up to one thousand dollars ($1,000) for each day the report or document is not received.

If you have any questions you may call Ms. Ana Townsend at (213) 576-6738 or Dr. Rebecca Chou at (213) 576-6733.

Sincerely,

Jonathan Bishop
Executive Officer

Enclosures:
1. Requirements for Subsurface Soil Investigation
2. Requirements for Groundwater Investigations
3. Laboratory Requirements for Soil and Water Sample Analyses
4. Advisory - Active Soil Gas Investigation.

cc: See Mailing List

Robert Sams, Office of Chief Counsel, State Water Resources Control Board
Jeff Dhont, United States Environmental Protection Agency, Region IX
Susan Keydel, United States Environmental Protection Agency
Andre LaMontagne, Winefield & Associates, Inc.

Law Offices of Capp and Marsh
4317 Silver Spring Way
Oceanside, CA 92057-6521
Tel. (760) 231 9851
Fax. (760) 231 6272
E-mail: jonccapp@cox.net

5/23/2006

BY FACSIMILE TO 213 576 6640, EMAIL, AND US MAIL

Ms. Ana Townsend & Dr. Rebecca Chou
California Regional Water Quality Control Board
Los Angeles Region
320 W. 4th Street, Suite 200
Los Angeles, CA 90013

Dear Ms. Townsend & Dr. Chou:

Re: Water Code Section 13267 Order at Former Amoco Chemical Polystyrene Facility located at 1225 West 196th Street, Torrance, California (SLIC no. 214)

As you know these offices represent the American Polystyrene Corporation.

Following my conversation with Dr. Chou, please let this letter serve as a formal request on behalf of both the American Polystyrene Corporation and the Atlantic Richfield Corporation for a 60 (sixty) day extension of the June 30, 2006 date contained in your letter dated March 1, 2000.

As I told Dr. Chou over the telephone, the relevant officers and representatives of both the American Polystyrene Corporation and Atlantic Richfield have met in person to discuss how to work together to comply with the reasonable demands of the Regional Board.

Despite our progress, we would however request that we receive more time to develop and submit the work plan requested by the Board. We believe that up to and including August 30, 2006 is a reasonable time period within which to comply. Obviously, we will in any event

comply with your request as soon as is reasonably practicable, and hopefully before the end of August.

Please contact me directly on my direct line (760) 231 6498 if you have any questions.

Sincerely,

Jonathan Capp

Cc. Carolyn Tan, APC. Michael McAnulty

California Regional Water Quality Control Board

Los Angeles Region

Recipient of the 2001 *Environmental Leadership Award* from Keep California Beautiful

Linda S. Adams
Agency Secretary

320 W 4th Street, Suite 200, Los Angeles, California 90013
Phone (213) 576-6600 FAX (213) 576-6640 - Internet Address: http://www.waterboards.ca.gov/losangeles

Arnold Schwarzenegger
Governor

July 5, 2006

Mr. Michael McAnulty
Environmental Business Manager
Atlantic Richfield Corpration
6 Centerpointe Drive
La Palma, CA 90623

Ms. Carolyn Tan
American Polystyrene Company
1225 West 196th Street
Torrance, CA 90502

EXTENSION APPROVAL - CALIFORNIA WATER CODE (CWC) SECTION 13267 - REQUEST FOR SUBSURFACE INVESTIGATION FOR UNAUTHORIZED DISCHARGES AT FORMER AMOCO CHEMICAL COMPANY POLYSTYRENE FACILITY, 1225 WEST 196TH STREET, TORRANCE, CALIFORNIA 90502(SLIC NO. 0214)

Dear Mr. McAnulty and Ms. Tan:

Regional Water Quality Control Board (Regional Board) have received a letter dated May 23, 2006, prepared by Mr. Jonathan Capp, requesting a 60-day extension to submit a work plan for soil gas, soil and groundwater investigation for the subject site, required in our March 1, 2006 California Water Code Section 13267 letter.

According to May 23, 2006 letter, additional time is needed to review data and prepare required workplan. We understand that a time extension is needed to ensure adequate time for reviewing data and finalizing the workplan that will meet all necessary requirements. Therefore, the due date for submittal of the required workplan to this Regional Board by June 30, 2006 is modified to August 30, 2006.

This letter constitutes our approval for time extension to submit the workplan by **August 30, 2006.**

A report summarizing all soil vapor, soil and groundwater sampling data collected during this investigation shall be submitted to the Regional Board by **November 30, 2006**. The report shall include the conclusions from this investigation, recommendations for additional investigations, and/or plans for site remediation as needed. In addition, site-specific soil screening levels (SSLs) and soil vapor screening levels (SVSLs) for groundwater resource protection shall be developed based on our May 1996, Interim Site Assessment and Cleanup Guidebook. Please include the SSLs and SVSLs in the investigation report to be submitted by November 30, 2006.

You are required to perform quarterly groundwater monitoring. The quarterly groundwater monitoring report must be submitted by the fifteenth day following the end of the quarter, as shown in the following schedule with the next report due on **October 15, 2006**:

Report Period	Report Due Date
January - March	April 15th
April – June	July 15th
July – September	October 15th
October - December	January 15th

Pursuant to Section 13268 of the California Water Code, failure to submit the required reports or documents by the due dates may result in civil liability administratively imposed by the Regional Board in an amount up to one thousand dollars ($1,000) for each day the report or document is not received.

Should you have any questions, please contact Dr. Rebecca Chou at (213) 576-6733.

Sincerely,

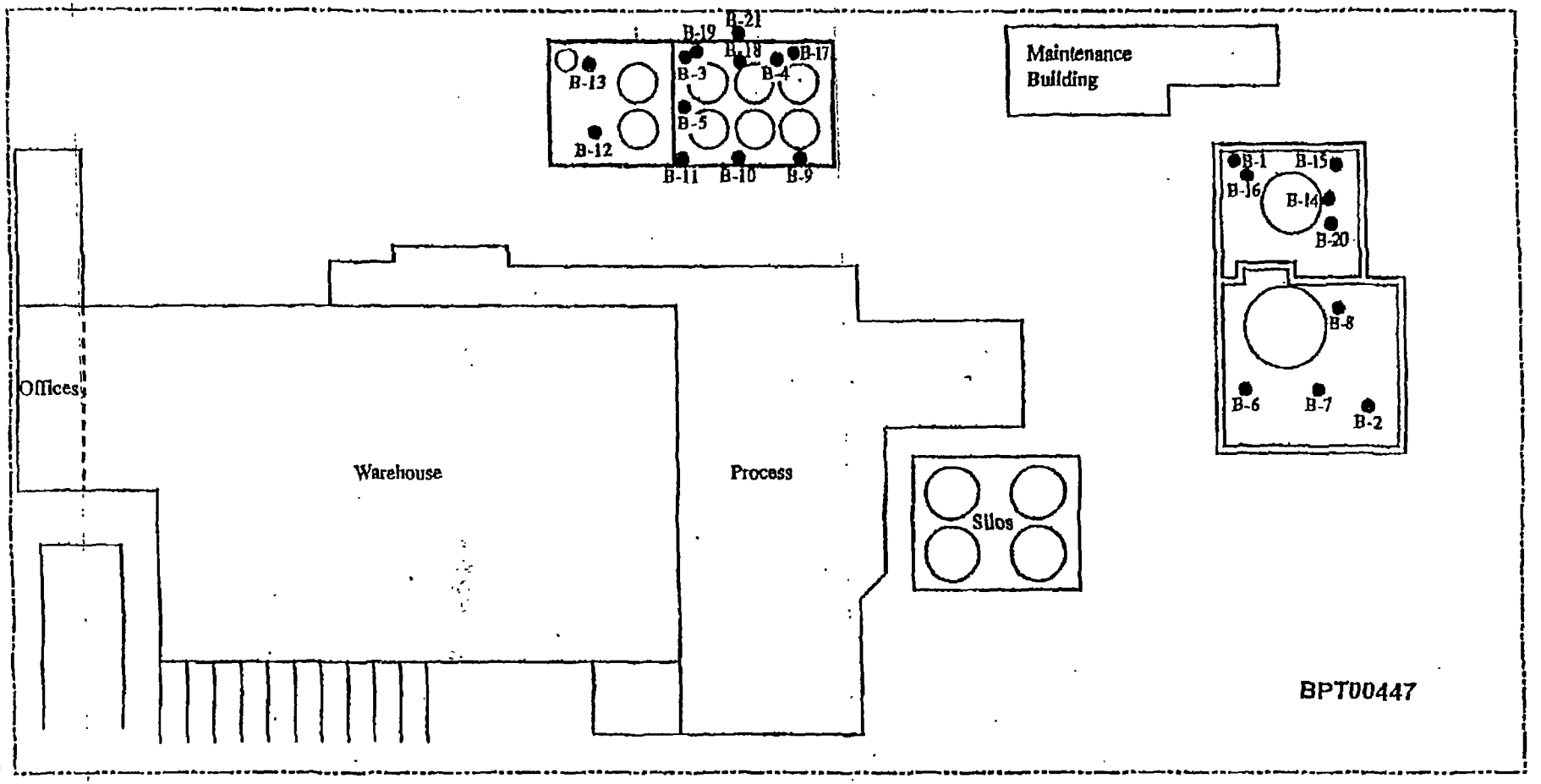
Jonathan Bishop
Executive Officer

cc: Mr. Jeffrey Dhont, U.S. Environmental Protection Agency
Mr. Chuck Stevens, Ecology Control Industries
Mr. Bob Scott, Boeing Company
Mr. Fred Benz, PACCAR
Mr. Peter Tsai, Mighty USA
Mr. Emerito Tito, Mighty USA
Mr. David Gurewitz,
Mr. Anthony Lizzi, Earth Tech, Inc.
Mr. Jonathan Capp, Law Offices of Capp and Marsh

ATTACHMENT B

Historical Soil Sampling Locations and Analytical Results

American Polystyrene Corporation Facility
1225 West 196th Street
Torrance, California
SECOR Project No. 37BP.XB010.03



N

0 40 80

Scale in feet

● B-1 Exploratory Boring Approximate Location

Soil Sample Approximate Locations

Amoco Chemical Company
Polystyrene Facility
1225 West 196th Street
Torrance, California

AMOCO

May, 1992

Attachment 2

BPACC01650

Analytical Results for Soil Samples
Amoco Chemical Company
Polystyrene Facility, Torrance, California

Sample Location/Depth (ft)	Styrene	Ethyl-benzene	TCE	PCE	1,1,1-TCA	Benzene	Carbon disulfide	Toluene
B-01/01	<1.0	50	<1.0	4	<1.0	<1.0	<1.0	<1.0
TD - 5 ft	--	--	--	--	--	--	--	--
B-02/01	--	--	--	--	--	--	--	--
TD - 3 ft	--	--	--	--	--	--	--	--
B-03/05	9	47	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
TD - 5 ft	--	--	--	--	--	--	--	--
B-04/02	<2.0	140	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
TD - 5 ft	--	--	--	--	--	--	--	--
B-05/01	100	720	<10	<10	<10	<10	<10	<10
TD - 5 ft	--	--	--	--	--	--	--	--
B-06/05	--	--	--	--	--	--	--	--
/10	<0.1	<0.05	0.1	<0.05	<0.05	<0.05	<0.1	<0.05
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	--	--	--	--	--	--	--	--
B-07/05	--	--	--	--	--	--	--	--
/10	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	--	--	--	--	--	--	--	--
B-08/05	--	--	--	--	--	--	--	--
/10	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	--	--	--	--	--	--	--	--
B-09/05	--	--	--	--	--	--	--	--
/10	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/15	--	--	--	--	--	--	--	--
/20	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
B-10/05	--	--	--	--	--	--	--	--
/10	<1.0	<0.5	44	8	<0.5	<0.5	<1.0	<0.5
/15	--	--	--	--	--	--	--	--
/20	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05

Analytical Results for Soil Samples
Amoco Chemical Company
Polystyrene Facility, Torrance, California

Sample Location/Depth (ft)	Styrene	Ethyl-benzene	TCE	PCE	1,1,1-TCA	Benzene	Carbon disulfide	Toluene
B-11/05	--	--	--	--	--	--	--	--
/10	--	--	--	--	--	--	--	--
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
B-12/05	--	--	--	--	--	--	--	--
/10	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	--	--	--	--	--	--	--	--
B-13/05	--	--	--	--	--	--	--	--
/10	--	--	--	--	--	--	--	--
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
B-14/05	--	--	--	--	--	--	--	--
/10	--	--	--	--	--	--	--	--
/15	1.2	0.7	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	4.4	0.95	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
B-15/05	--	--	--	--	--	--	--	--
/10	--	--	--	--	--	--	--	--
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
B-16/05	--	--	--	--	--	--	--	--
/10	<0.1	<0.05	0.09	0.08	<0.05	<0.05	<0.1	<0.05
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	--	--	--	--	--	--	--	--
B-17/05	--	--	--	--	--	--	--	--
/10	--	--	--	--	--	--	--	--
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05

Analytical Results for Soil Samples
Amoco Chemical Company
Polystyrene Facility, Torrance, California

Sample Location/Depth (ft)	Styrene	Ethyl-benzene	TCE	PCE	1,1,1-TCA	Benzene	Carbon disulfide	Toluene
B-18/05	--	--	--	--	--	--	--	--
/10	--	--	--	--	--	--	--	--
/15	330	65	46	2.4	<1.0	<1.0	<2.0	1.1
/20	100	20	6.8	1.4	<1.0	<1.0	<2.0	<1.0
B-19/05	--	--	--	--	--	--	--	--
/10	--	--	--	--	--	--	--	--
/15	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
/20	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
B-20/20	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
/25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
/30	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
/35	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
/40	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
B-21/20	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
/25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1
/30	<0.05	<0.05	0.11	<0.05	<0.05	<0.05	0.14	<0.1
/35	<0.05	<0.05	0.86	<0.05	<0.05	0.05	0.08	<0.1
/40	<0.05	<0.05	0.15	0.2	0.07	<0.05	<0.05	<0.1

TCE = trichloroethene
PCE = tetrachloroethene
TCA = trichloroethane
-- = Sample not analyzed
<0.1 = Not detected at or above concentration indicated

Notes: (1) Laboratory analysis by GC/MS (EPA Method 8240).
Concentrations reported in mg/kg (ppm).
Compounds not reported were not detected in any sample.
(2) Soil borings B-1 thru B-5:
* Soil samples collected at 1 foot intervals.
* Soil immediately above sample interval was screened in field for organic vapors.
* Samples were selected for laboratory analysis based on field screening results.

ENGINEERING
ENTERPRISES, INC.

WATER RESOURCES SPECIALISTS

6695 E. Pacific Coast Highway Long Beach, CA 90803 213-430-6500

May 29, 1990

Amoco Chemical Company
1225 West 196th Street
Torrance, California 90502

Attention: Mr. Jeff Campbell
Process Engineer

Subject: Report of Additional Subsurface Assessment and Groundwater Sampling
Amoco Chemical Facility
1225 West 196th Street
Torrance, California
Project No. 512-345

Dear Mr. Campbell:

Presented herewith is the report of subsurface assessment and groundwater sampling performed by Engineering Enterprises, Inc. (EEI). This assessment was performed at the request of Amoco, Inc. to evaluate the presence of styrene, ethylbenzene and associated chemicals in two boreholes and six groundwater monitoring wells at the subject site.

We trust this report meets your current requirements. Should you have questions regarding the results contained herein, or require further clarification, please contact us. We appreciate the opportunity to be of continued service to Amoco.

Respectfully,

William E. Halbert
Project Hydrogeologist

WEH:weh

BPT00126

REPORT OF ADDITIONAL SUBSURFACE ASSESSMENT AND GROUNDWATER SAMPLING AMOCO CHEMICAL FACILITY 1225 WEST 196TH STREET TORRANCE, CALIFORNIA

Prepared for:

Amoco Chemical Company
1225 West 196th Street
Torrance, California 90502

Submitted by:

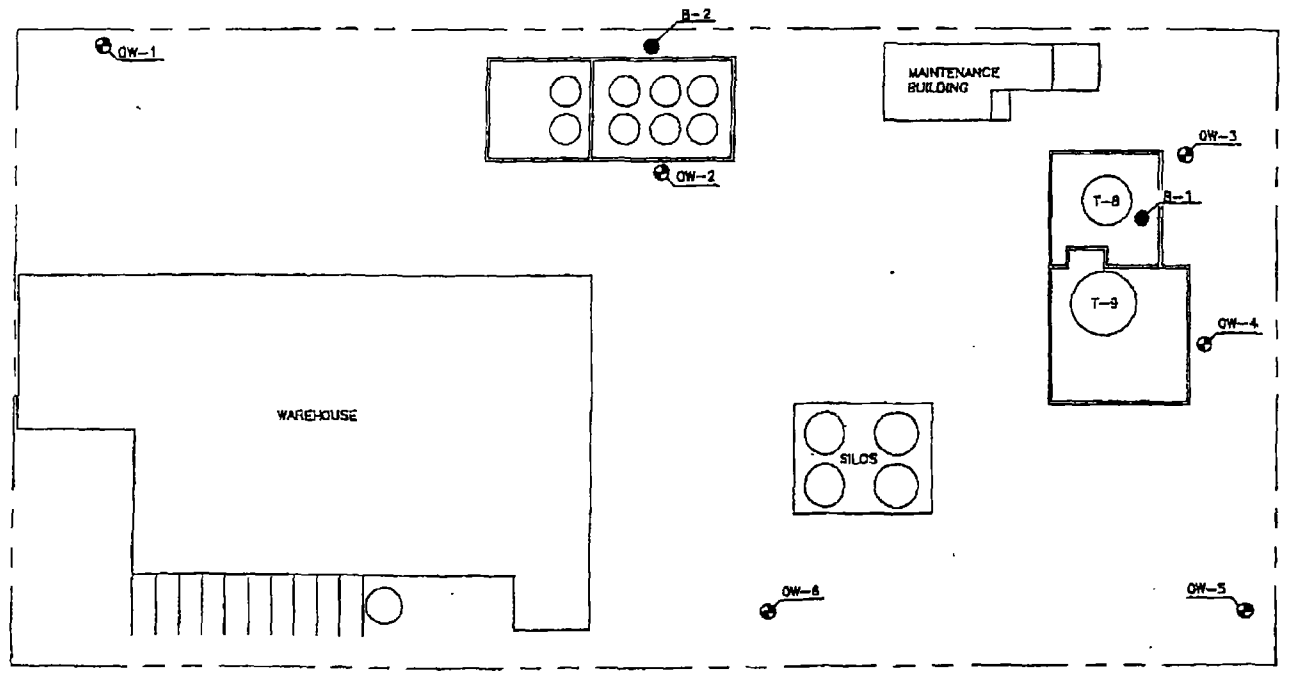
Engineering Enterprises, Inc.
6695 East Pacific Coast Highway
Long Beach, California 90803
213/430-6500

William E. Halbert
Project Hydrogeologist

Robert T. Bean
Registered Geologist #1339
CEG #483

BPT00127

EEI ENGINEERING ENTERPRISES, INC.



OW-3 MONITORING WELL NUMBER

B-1 EXPLORATORY BORING LOCATION

N

0 40 80

SCALE IN FEET

BPT00134

BORING AND MONITORING WELL LOCATION MAP
1225 WEST 196th STREET
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345

DATE: MARCH, 1990

FIGURE 2

BPACC01656

5.0 DISCUSSION OF RESULTS

No detectable concentrations of analyzed compounds were reported in soil samples collected from boring B-1. Soil samples from boring B-2 did not contain detectable concentrations of analyzed compounds at depths of 20 and 25 feet bgs. The soil sample collected from 30 feet contained carbon disulfide at a reported concentration of 0.14 milligrams per kilogram (mg/kg) and trichloroethene at a reported concentration of 0.11 mg/kg. The soil sample collected from a depth of 35 feet bgs contained reported concentrations of carbon disulfide at 0.06 mg/kg, trichloroethene at 0.86 mg/kg, and benzene at 0.05 mg/kg. The soil sample collected from a depth of 40 feet bgs contained reported concentrations of trichloroethene at 0.15 mg/kg, tetrachloroethene at 0.2 mg/kg and 1,1,1 trichloroethane at 0.07 mg/kg. Presented in Table 1 are laboratory results for soil samples from boring B-2. Laboratory reports for soil samples are contained in Appendix C, Part 1.

TABLE 1

LABORATORY RESULTS - BORING B-2(a)

Depth (ft.)	Benzene	Carbon Disulfide	TCE(b)	PCE(c)	1,1,1-TCA(d)
20	ND(0.05)	ND(.05)(e)	ND(0.05)	ND(0.05)	ND(0.05)
25	ND(0.05)	ND(.05)	ND(0.05)	ND(0.05)	ND(0.05)
30	ND(0.05)	0.14	0.11	ND(0.05)	ND(0.05)
35	0.05	0.06	0.86	ND(0.05)	ND(0.05)
40	ND(0.05)	ND(0.05)	0.15	0.20	0.07

(a) All concentrations reported in milligrams per kilogram.
(b) TCE = Trichloroethene.
(c) PCE = Tetrachloroethene.
(d) TCA = Trichloroethane.
(e) ND = Not detected above concentration in parentheses.

Groundwater samples collected 2-1-90 from all six wells all contained detectable concentrations of trichloroethene (TCE) ranging from 500 to 5,800 micrograms per liter (ug/L). Tetrachloroethene (PCE) was detected in wells OW-2 to OW-6 in the concentration range from 50 ug/L to 1,600 ug/L. PCE was not detected in OW-1 above a detection limit of 80 ug/L. The compounds 1,1-dichloroethene and 1,2-dichloroethene (total) were detected in wells OW-4, OW-5 and OW-6 in reported concentrations ranging from 17 ug/L to 200 ug/L. Of these two compounds, only 1,2-dichloroethene was detected in OW-3 at a concentration of 54 ug/L. Neither compound was reported to be present in groundwater samples from wells OW-1 and OW-2 above detection limits of 80 ug/L and 4 ug/L,

EEI
ENGINEERING
ENTERPRISES, INC.
WATER RESOURCES SPECIALISTS

21818 S Wilmington Avenue, Suite 405 Long Beach, CA 90810 213/518-4597

November 10, 1988

Amoco Corporation
7201 East 38th Street
Space 7253
P.O. Box 3385
Tulsa, Oklahoma 74102

Attention: Mr. Robert Hockman
Groundwater Management Section

Subject: Report of Shallow Soil Sampling
Amoco Chemical Facility
1225 196th Street
Torrance, California
Project No. 512-345

Dear Mr. Hockman:

Engineering Enterprises, Inc. (EEI) is pleased to provide you with this report outlining the results of our shallow soil sampling assessment at your chemical facility situated in Torrance, California.

If you have any questions regarding this report or require additional information, please do not hesitate to contact us. EEI appreciates the opportunity to be of service to Amoco Corporation.

Sincerely,

Stephen M. Testa
Vice President
West Coast Operations

SMT/mag

BPT00003

REPORT OF SHALLOW SOIL SAMPLING

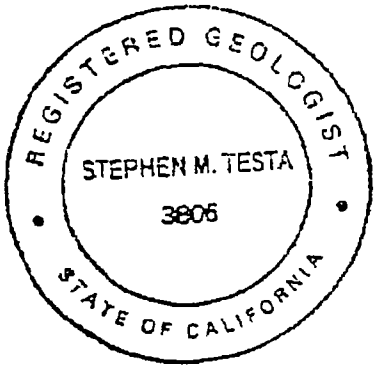
AMOCO CHEMICAL FACILITY

1225 196TH STREET

TORRANCE, CALIFORNIA

Submitted by:

Engineering Enterprises, Inc.
21818 S. Wilmington Avenue
Suite 405
Long Beach, California 90810

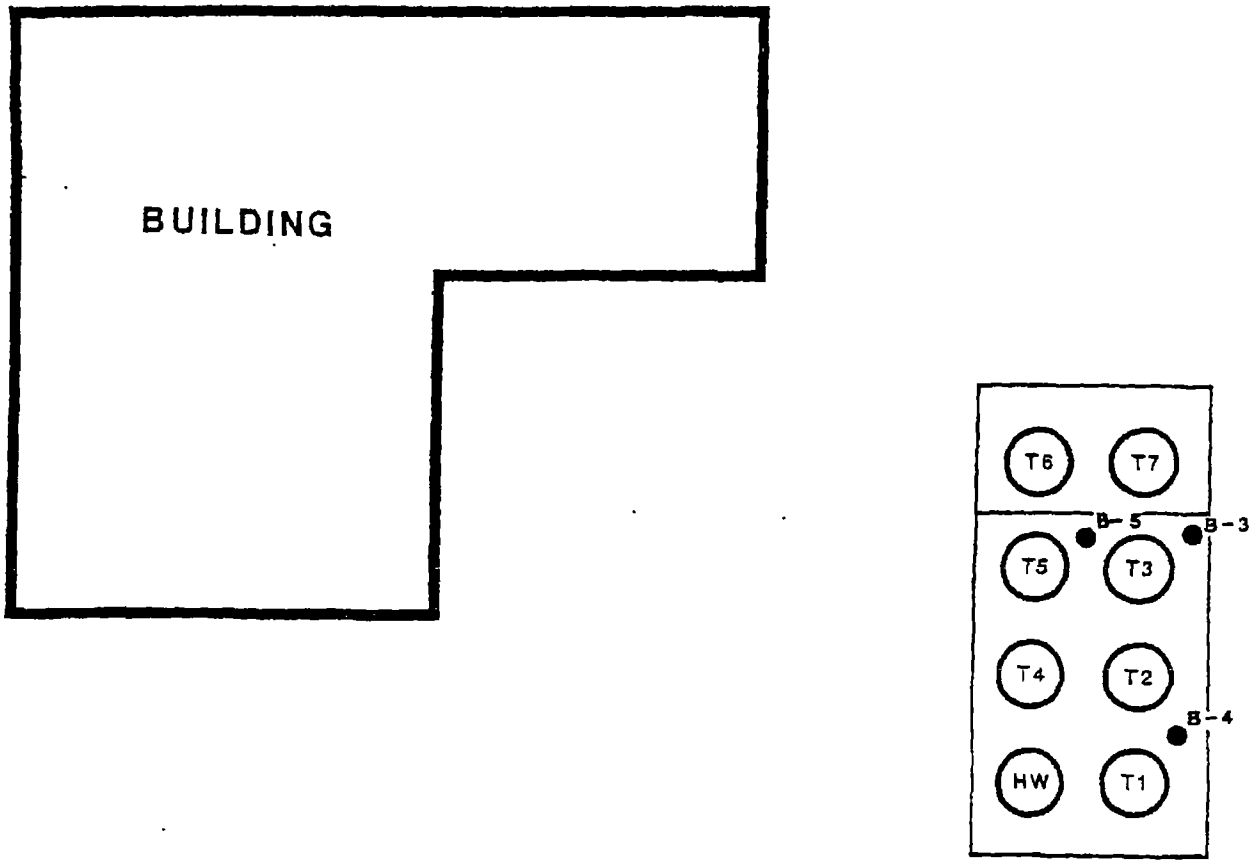


William E. Halbert
Project Hydrogeologist

Stephen M. Testa
Vice President
West Coast Operations

BPT00004

EEI ENGINEERING ENTERPRISES, INC.



BPT00008

NOT TO SCALE

APPROXIMATE BORING LOCATIONS
AMOCO CHEMICAL FACILITY
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO. 512-345 FIGURE 2

Enseco

CRL Environmental - South Coast
7440 Lincoln Way • Garden Grove, CA 92641
(213) 598-0458 • (714) 898-6370 • (800) LAB-1-CRL
FAX: (714) 891-5917

November 2, 1988

ENGINEERING ENTERPRISES, INC.
21818 Wilmington Avenue, Suite 405
Long Beach, CA 90810
ATTN: Mr. Bill Halbert

ANALYSIS NO.: 830101-001/004
ANALYSES: EPA Method 8240
DATE SAMPLED: 10/26/88
DATE SAMPLE REC'D: 10/26/88
PROJECT: 512-345

Enclosed with this letter is the report on the chemical and physical analyses on the samples from ANALYSIS NO: 830101-001/004 shown above.

The samples were received by CRL in a chilled state, intact, and with the chain-of-custody record attached. Sample seals were intact.

Solid samples are reported on an "as received" basis.

Results were faxed on October 31, 1988 at 9:15 A.M.

Please note that ND( ) means not detected at the detection limit expressed within the parentheses.

REVIEWED

APPROVED

BPT00017

BPACC01662

CRL Environmental - South Coast
7440 Lincoln Way • Garden Grove, CA 92641
(213) 598-0458 • (714) 898-6370 • (800) LAB-1-CRL
FAX: (714) 891-5917

LABORATORY REPORT

ENGINEERING ENTERPRISES, INC.
21818 Wilmington Avenue, Suite 405
Long Beach, CA 90810
ATTN: Mr. Bill Halbert

Sample ID: S-01-01

ANALYSIS NO.: 830101-001
ANALYSES: EPA Method 8240
DATE SAMPLED: 10/26/88
DATE SAMPLE REC'D: 10/26/88
DATE ANALYZED: 10/28/88
SAMPLE TYPE: Solid
PROJECT: 512-345

EPA METHODS 624/8240 VOLATILE ORGANICS

	(ug/kg)		(ug/kg)
Chloromethane	ND(2,000.)	1,2-Dichloropropane	ND(1,000.)
Bromomethane	ND(2,000.)	Trans-1,3-Dichloropropene	ND(1,000.)
Vinyl Chloride	ND(2,000.)	Trichloroethene	ND(1,000.)
Chloroethane	ND(2,000.)	Dibromochloromethane	ND(1,000.)
Methylene Chloride	ND(1,000.)	1,1,2-Trichloroethane	ND(1,000.)
Acetone	ND(2,000.)	Benzene	ND(1,000.)
Carbon Disulfide	ND(1,000.)	cis-1,3-Dichloropropene	ND(1,000.)
1,1-Dichloroethene	ND(1,000.)	2-Chloroethylvinyl ether	ND(2,000.)
1,1-Dichloroethane	ND(1,000.)	Bromoform	ND(1,000.)
Trans-1,2-Dichloroethene	ND(1,000.)	4-Methyl-2-Pentanone	ND(2,000.)
Chloroform	ND(1,000.)	2-Hexanone	ND(2,000.)
1,2-Dichloroethane	ND(1,000.)	Tetrachloroethene	4,000.
2-Butanone	ND(2,000.)	1,1,2,2-Tetrachloroethane	ND(1,000.)
1,1,1-Trichloroethane	ND(1,000.)	Toluene	ND(1,000.)
Carbon Tetrachloride	ND(1,000.)	Chlorobenzene	ND(1,000.)
Vinyl Acetate	ND(2,000.)	Ethylbenzene	50,000.
Bromodichloromethane	ND(1,000.)	Styrene	ND(1,000.)
		Total Xylenes	ND(1,000.)

BPT00018

BPACC01663

CRL Environmental - South Coast
7440 Lincoln Way • Garden Grove, CA 92641
(213) 598-0458 • (714) 898-6370 • (800) LAB-1-CRL
FAX: (714) 891-5917

LABORATORY REPORT

ENGINEERING ENTERPRISES, INC.
21818 Wilmington Avenue, Suite 405
Long Beach, CA 90810
ATTN: Mr. Bill Halbert

Sample ID: S-03-05

ANALYSIS NO.: 830101-002
ANALYSES: EPA Method 8240
DATE SAMPLED: 10/26/88
DATE SAMPLE REC'D: 10/26/88
DATE ANALYZED: 10/29/88
SAMPLE TYPE: Solid
PROJECT: 512-345

EPA METHODS 624/8240 VOLATILE ORGANICS

	(ug/kg)		(ug/kg)
Chloromethane	ND(2,000.)	1,2-Dichloropropane	ND(1,000.)
Bromomethane	ND(2,000.)	Trans-1,3-Dichloropropene	ND(1,000.)
Vinyl Chloride	ND(2,000.)	Trichloroethene	ND(1,000.)
Chloroethane	ND(2,000.)	Dibromochloromethane	ND(1,000.)
Methylene Chloride	ND(1,000.)	1,1,2-Trichloroethane	ND(1,000.)
Acetone	ND(2,000.)	Benzene	ND(1,000.)
Carbon Disulfide	ND(1,000.)	cis-1,3-Dichloropropene	ND(1,000.)
1,1-Dichloroethene	ND(1,000.)	2-Chloroethylvinyl ether	ND(2,000.)
1,1-Dichloroethane	ND(1,000.)	Bromoform	ND(1,000.)
Trans-1,2-Dichloroethene	ND(1,000.)	4-Methyl-2-Pentanone	ND(2,000.)
Chloroform	ND(1,000.)	2-Hexanone	ND(2,000.)
1,2-Dichloroethane	ND(1,000.)	Tetrachloroethene	ND(1,000.)
2-Butanone	ND(2,000.)	1,1,2,2-Tetrachloroethane	ND(1,000.)
1,1,1-Trichloroethane	ND(1,000.)	Toluene	ND(1,000.)
Carbon Tetrachloride	ND(1,000.)	Chlorobenzene	ND(1,000.)
Vinyl Acetate	ND(2,000.)	Ethylbenzene	47,000.
Bromodichloromethane	ND(1,000.)	Styrene	9,000.
		Total Xylenes	ND(1,000.)

BPT00019

BPACC01664

CRL Environmental - South Coast
7440 Lincoln Way • Garden Grove, CA 92641
(213) 598-0458 • (714) 898-6370 • (800) LAB-1-CRL
FAX: (714) 891-5917

LABORATORY REPORT

ENGINEERING ENTERPRISES, INC.
21818 Wilmington Avenue, Suite 405
Long Beach, CA 90810
ATTN: Mr. Bill Halbert

Sample ID: S-04-02

ANALYSIS NO.: 830101-003
ANALYSES: EPA Method 8240
DATE SAMPLED: 10/26/88
DATE SAMPLE REC'D: 10/26/88
DATE ANALYZED: 10/28/88
SAMPLE TYPE: Solid
PROJECT: 512-345

EPA METHODS 624/8240 VOLATILE ORGANICS

	(ug/kg)		(ug/kg)
Chloromethane	ND(5,000.)	1,2-Dichloropropane	ND(2,000.)
Bromomethane	ND(5,000.)	Trans-1,3-Dichloropropene	ND(2,000.)
Vinyl Chloride	ND(5,000.)	Trichloroethene	ND(2,000.)
Chloroethane	ND(5,000.)	Dibromochloromethane	ND(2,000.)
Methylene Chloride	ND(2,000.)	1,1,2-Trichloroethane	ND(2,000.)
Acetone	ND(5,000.)	Benzene	ND(2,000.)
Carbon Disulfide	ND(2,000.)	cis-1,3-Dichloropropene	ND(2,000.)
1,1-Dichloroethene	ND(2,000.)	2-Chloroethylvinyl ether	ND(5,000.)
1,1-Dichloroethane	ND(2,000.)	Bromoform	ND(2,000.)
Trans-1,2-Dichloroethene	ND(2,000.)	4-Methyl-2-Pentanone	ND(5,000.)
Chloroform	ND(2,000.)	2-Hexanone	ND(5,000.)
1,2-Dichloroethane	ND(2,000.)	Tetrachloroethene	ND(2,000.)
2-Butanone	ND(5,000.)	1,1,2,2-Tetrachloroethane	ND(2,000.)
1,1,1-Trichloroethane	ND(2,000.)	Toluene	ND(2,000.)
Carbon Tetrachloride	ND(2,000.)	Chlorobenzene	ND(2,000.)
Vinyl Acetate	ND(5,000.)	Ethylbenzene	140,000.
Bromodichloromethane	ND(2,000.)	Styrene	ND(2,000.)
		Total Xylenes	ND(2,000.)

BPT00020

CRL Environmental - South Coast
7440 Lincoln Way • Garden Grove, CA 92641
(213) 598-0458 • (714) 898-6370 • (800) LAB-1-CRL
FAX: (714) 891-5917

Enseco

LABORATORY REPORT

ENGINEERING ENTERPRISES, INC.
21818 Wilmington Avenue, Suite 405
Long Beach, CA 90810
ATTN: Mr. Bill Halbert

Sample ID: S-05-01

ANALYSIS NO.: 830101-004
ANALYSES: EPA Method 8240
DATE SAMPLED: 10/26/88
DATE SAMPLE REC'D: 10/26/88
DATE ANALYZED: 10/28/88
SAMPLE TYPE: Solid
PROJECT: 512-345

EPA METHODS 624/8240 VOLATILE ORGANICS

	(mg/kg)		(mg/kg)
Chloromethane	ND(20.)	1,2-Dichloropropane	ND(10.)
Bromomethane	ND(20.)	Trans-1,3-Dichloropropene	ND(10.)
Vinyl Chloride	ND(20.)	Trichloroethene	ND(10.)
Chloroethane	ND(20.)	Dibromochloromethane	ND(10.)
Methylene Chloride	ND(10.)	1,1,2-Trichloroethane	ND(10.)
Acetone	ND(20.)	Benzene	ND(10.)
Carbon Disulfide	ND(10.)	cis-1,3-Dichloropropene	ND(10.)
1,1-Dichloroethene	ND(10.)	2-Chloroethylvinyl ether	ND(20.)
1,1-Dichloroethane	ND(10.)	Bromoform	ND(10.)
Trans-1,2-Dichloroethene	ND(10.)	4-Methyl-2-Pentanone	ND(20.)
Chloroform	ND(10.)	2-Hexanone	ND(20.)
1,2-Dichloroethane	ND(10.)	Tetrachloroethene	ND(10.)
2-Butanone	ND(20.)	1,1,2,2-Tetrachloroethane	ND(10.)
1,1,1-Trichloroethane	ND(10.)	Toluene	ND(10.)
Carbon Tetrachloride	ND(10.)	Chlorobenzene	ND(10.)
Vinyl Acetate	ND(20.)	Ethylbenzene	720.
Bromodichloromethane	ND(10.)	Styrene	100.
		Total Xylenes	ND(10.)

BPT00021

CRL Environmental - South Coast
7440 Lincoln Way • Garden Grove, CA 92641
(213) 598-0458 • (714) 898-6370 • (800) LAB-1-CRL
FAX: (714) 891-5917

Enseco

LABORATORY REPORT

ENGINEERING ENTERPRISES, INC.
21818 Wilmington Avenue, Suite 405
Long Beach, CA 90810
ATTN: Mr. Bill Halbert

ANALYSIS NO.: 830101-001/004
ANALYSES: EPA Method 8240
DATE SAMPLED: 10/26/88
DATE SAMPLE REC'D: 10/26/88
SAMPLE TYPE: Solid
PROJECT: 512-345

QA/QC SUMMARY

Date	Parameter(method)	Average Spike Recovery%	Acceptable Range%	Relative Percent Difference	Acceptable Range%
10/28-29/88	1,1-Dichloroethene (EPA 8240)	113	59-172	1	22
10/28-29/88	Chlorobenzene (EPA 8240)	91	59-139	*25	21

*RPD value due to matrix effect. Check standard verifies acceptable system performance.

BPT00022

BPACC01667

EEI ENGINEERING ENTERPRISES, INC.
21818 WILMINGTON AVE., SUITE 405
LONG BEACH, CA 90810 (213)518-4597

CHAIN OF CUSTODY RECORD

LABORATORY: Chemical Research Laboratory
7440 Lincoln Way
Garden Grove, Ca.

PROJECT NO. 512-345

PURCHASE ORDER NO.

SAMPLERS:(signature) Jay Boughton

Phone No.

Phone No:

Remarks:

SAMPLE NO.	DATE	TIME	Number of Containers	REMARKS
S-01-01	10/26/88		1	~~Hold for verbal~~ *8240
S-01-02			1	~~Analysis request~~
S-01-03			1	
S-02-01			1	
~~S-02-02~~				
S-03-01			1	
S-03-02			1	
S-03-05			1	*8240
S-04-01			1	
S-04-02			1	*8240
S-04-03			1	
S-04-05			1	
S-05-01			1	*8240
S-05-03	↓		1	

→ 24-48 HR TAT

* 10/27/88 - 8:20am - ANALYTICAL REQUEST FOR BTEX ON NOTED SAMPLES PLACED BY BOB HICKMAN OF AMOCO CHEM. CO. - Jay in LA Office

PINK COPY: SAMPLER RETAINS YELLOW COPY: LABORATORY COPY

WHITE COPY: LABORATORY SIGNS AND RETURNS WITH ANALYTICAL RESULTS

BPT00023

TOTAL NUMBER OF CONTAINERS: 13

Relinquished by:(signature) Jay Boughton	Received by:(signature)	Date/Time 10/26/88 4:30pm
Relinquished by:(signature)	Received by:(signature)	Date/Time
Relinquished by:(signature)	Received by:(signature)	Date/Time
Relinquished by:(signature)	Received for laboratory by:(signature)	Date/Time 10/26/88 4:30 PM

ATTACHMENT C

Historical Groundwater Sampling and Analytical Results

American Polystyrene Corporation Facility
1225 West 196th Street
Torrance, California
SECOR Project No. 37BP.XB010.03

WINEFIELD & ASSOCIATES, INC.
ENVIRONMENTAL AND SAFETY CONSULTANTS

American Polystyrene Corporation
Quarterly Groundwater Monitoring and Status Report
4th Quarter 2005

Site Name:	American Polystyrene Corporation
Site Location:	1225 W. 196th Street
Client Contact/Phone No.:	Mr. Carl Benninger / 310.329.6379
ıry Consultant/Contact/Phone No.:	Winefield & Associates / Andre LaMontagne / 562.495.5777
Lead Agency:	RWQCB, LA
Lead Agency File No.:	SLIC # 214
Lead Agency Contact/Phone No.:	Ms. Ana Townsend / 213.576.6738
Other Regulatory Agencies cc'd:	None

WORK PERFORMED THIS QUARTER (4th Quarter 2005):

- Gauged and sampled all wells at the site
- Laboratory analyzed groundwater samples collected.
- Provided groundwater monitoring report for 4th Quarter 2005

WORK PROPOSED FOR NEXT QUARTER (1st Quarter 2006):

- Gauge and sample all wells at the site.

XOW-1	XOW-3	XOW-5
XOW-2	XOW-4	XOW-6

- Laboratory analyzed groundwater samples collected.
- Provide groundwater monitoring report for 1st Quarter 2006

MONITORING RESULTS for 4th QUARTER 2005

Current phase of project:	Monitoring
Frequency of groundwater monitoring:	Quarterly

Wells sampled this quarter

XOW-1	XOW-3	XOW-5
XOW-2	XOW-4	XOW-6

110 PINE AVENUE, SUITE 900 • LONG BEACH • CALIFORNIA • 90802 • PHONE 562 495 5777 • FAX 562 495 5877

Current phase of project:	Monitoring
Frequency of groundwater monitoring:	Quarterly
Date measured:	12/20/05
Depth to groundwater (ft. below surface grade):	55.43-58.28
Groundwater flow direction:	Southwesterly
Groundwater flow direction last quarter:	Southwesterly
Is flow consistent with last quarter?	Yes
Wells with free product:	None

Well		Compound				
		1,1 Dichloro ethane (µg/L)	1,1 Dichloro ethene (µg/L)	cis 1,2-Dichloro ethene (µg/L)	Trichloro ethene (µg/L)	Tetrachloro ethene (µg/L)
XOW-1	Concentration	2.82	1.94	**18.6**	**973**	**171**
	Over MCL?	no	no	yes	yes	yes
	Relative to last quarter	Increase	Increase	Increase	Decrease	Increase
XOW-2	Concentration	1.80	nd	**35.8**	**2,990**	**386**
	Over MCL?	no	no	yes	yes	yes
	Relative to last quarter	Increase	Decrease	Increase	Increase	Increase
XOW03	Concentration	1.30	1.56	**24.5**	**742**	**99**
	Over MCL?	no	no	yes	yes	yes
	Relative to last quarter	Same	Decrease	Increase	Increase	Decrease
XOW-4	Concentration	2.28	**7.86**	**88.40**	**1,820**	**423**
	Over MCL?	no	yes	yes	yes	yes
	Relative to last quarter	Increase	Decrease	Increase	Increase	Increase
XOW-5	Concentration	4.73	**54.9**	**231.0**	**4,810**	**1,910**
	Over MCL?	no	yes	yes	yes	yes
	Relative to last quarter	Increase	Increase	Increase	Increase	Increase
XOW-6	Concentration	4.10	**21.7**	**127.0**	**7,160**	**2,050**
	Over MCL?	no	yes	yes	yes	yes
	Relative to last quarter	Increase	Decrease	Increase	Increase	Increase

* Compound is considered to have increased or decreased if concentration is greater or less than 5% from last quarter.

Wells and/or surface waters within 2,000 feet:	Unknown
Radius and direction from site:	Unknown
Current remediation method:	None
Gallons of water purged this quarter:	82
Disposal/recycling facility:	American Polystyrene Responsibility

Summary of unusual activity:

This quarter some compounds typically associated with gasoline were reported in the wells; specifically toluene, ethylbenzene, xylenes, and some trimethylbenzenes. In addition, naphthalene was also reported for the first time in the samples. The specific wells and concentrations are shown in Table 2.

Agency directive requirements:

- Continue quarterly groundwater monitoring

REVIEWED and APPROVED BY:

Matt Winefield, PE, CSP
Principal Consultant

Date: 1/17/06

APPENDICES:

Appendix 1: Groundwater Elevation Contour Map (Figure 1)
1,1 DCA Iso-concentration Map (Figure 2)
1,1 DCE Iso-concentration Map (Figure 3)
1,2 DCE Iso-concentration Map (Figure 4)
TCE Iso-concentration Map (Figure 5)
PCE Iso-concentration Map (Figure 6)
Metals Text Boxes on Map (Figure 7)

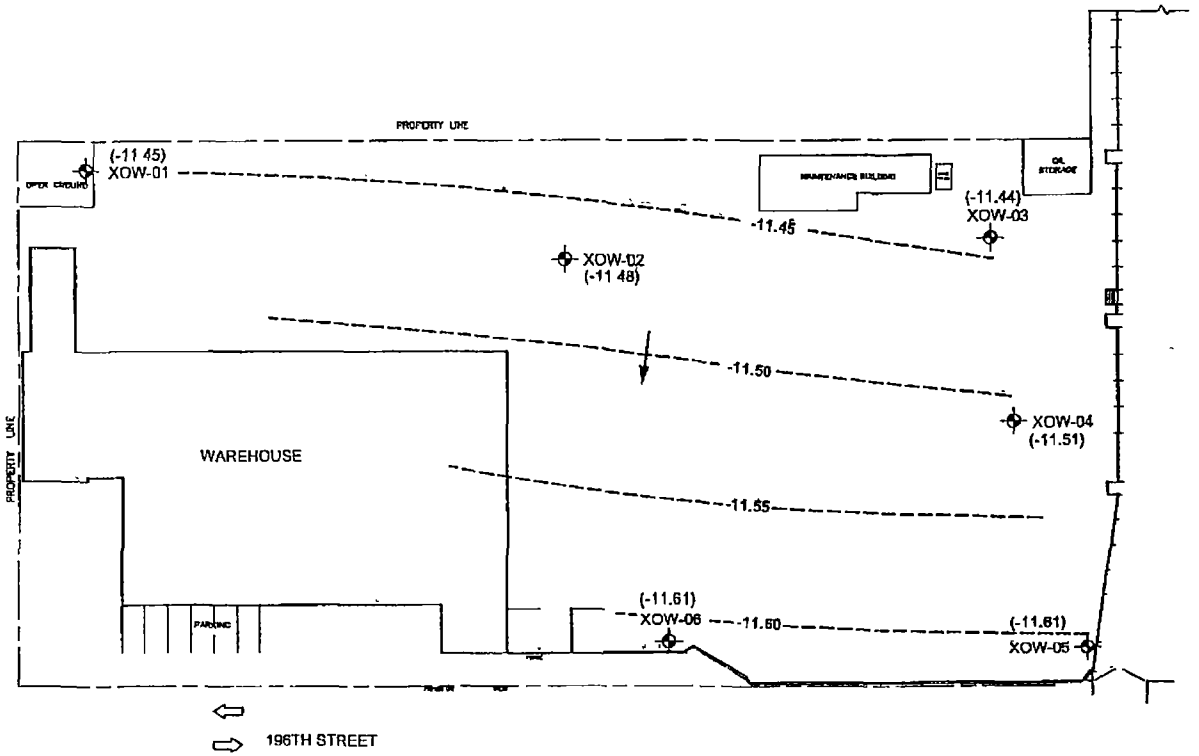
Appendix 2: Groundwater analysis and gauging results (Table 1)
Historical groundwater analysis and gauging results (Table 2)

Appendix 3: Groundwater monitoring and sampling field data sheets

Appendix 4: Laboratory reports and Chain-of-custody forms

Appendix 5: Purged water disposal manifests (will be sent under separate cover)

Appendix 6: Groundwater monitoring procedures



LEGEND

XOW-01 — GROUNDWATER MONITORING WELL

(-11.60) — GROUNDWATER ELEVATION (ft. MSL) MEASURED DECEMBER 20, 2005

-12.10 — GROUNDWATER ELEVATION CONTOUR (ft. MSL, CONTOUR INTERVAL = 0.10 ft.)

APPARENT GROUNDWATER FLOW DIRECTION

DASHED WHERE INFERRED, QUERIED WHERE UNCERTAIN

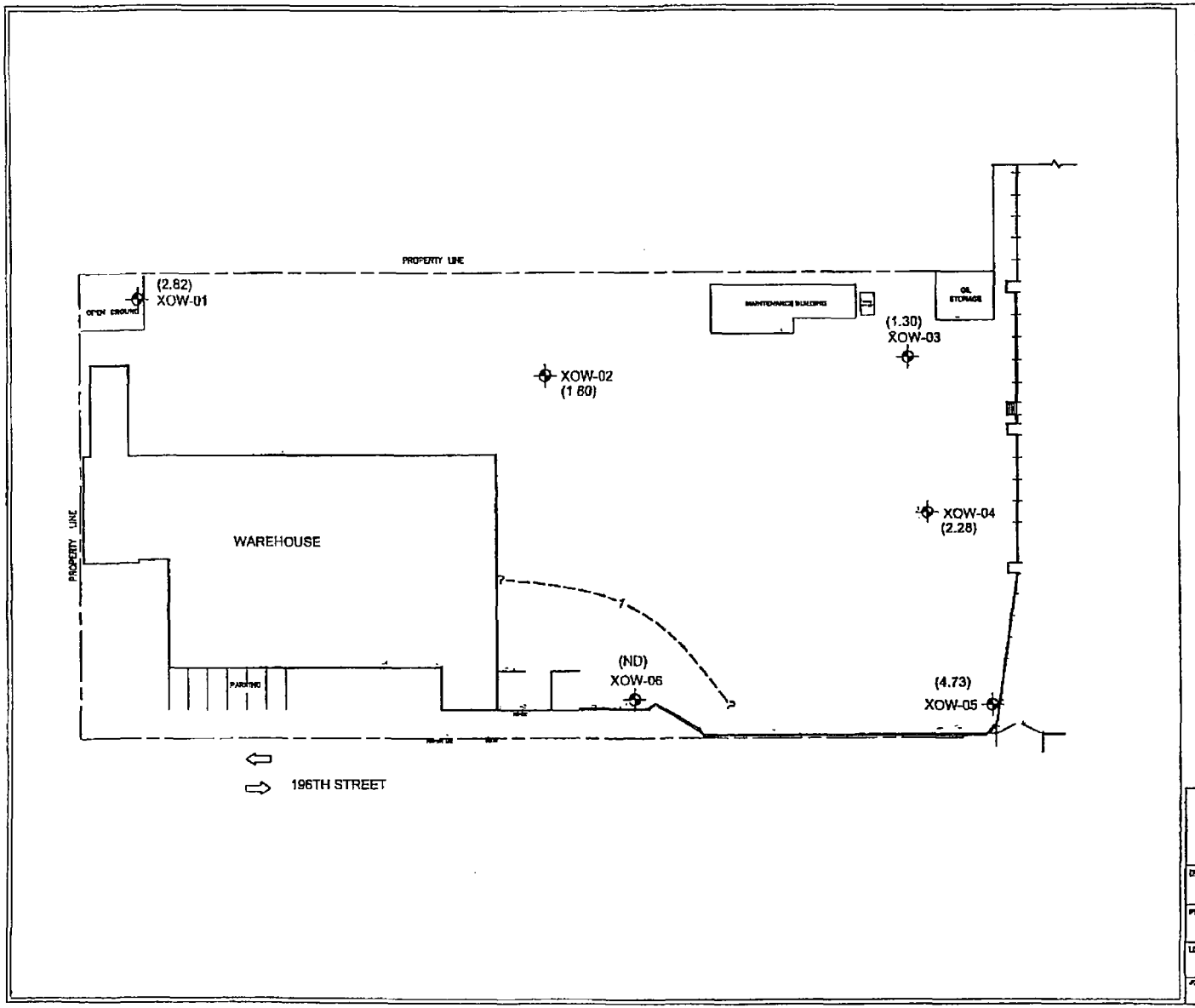
N

0 40

WINEFIELD & ASSOCIATES
ENVIRONMENTAL AND SAFETY CONSULTANTS

DESCRIPTION	GROUNDWATER GRADIENT MAP 4TH QUARTER 2005
PROJECT	AMERICAN POLYSTYRENE CORPORATION TORRANCE, CALIFORNIA
LOCATION	1225 W. 196TH STREET TORRANCE, CALIFORNIA

JOB NO.	DATE	FIGURE NO.
APC-04-071	1/5/2006	1



LEGEND

XOW-01 — GROUNDWATER MONITORING WELL

(1.04) — 1,1-DICHLOROETHANE (1,1-DCA) CONCENTRATION (µg/l)

---- 1 — 1,1-DCA ISO-CONCENTRATION CONTOUR

ND = NOT DETECTED AT LABORATORY DETECTION LIMIT

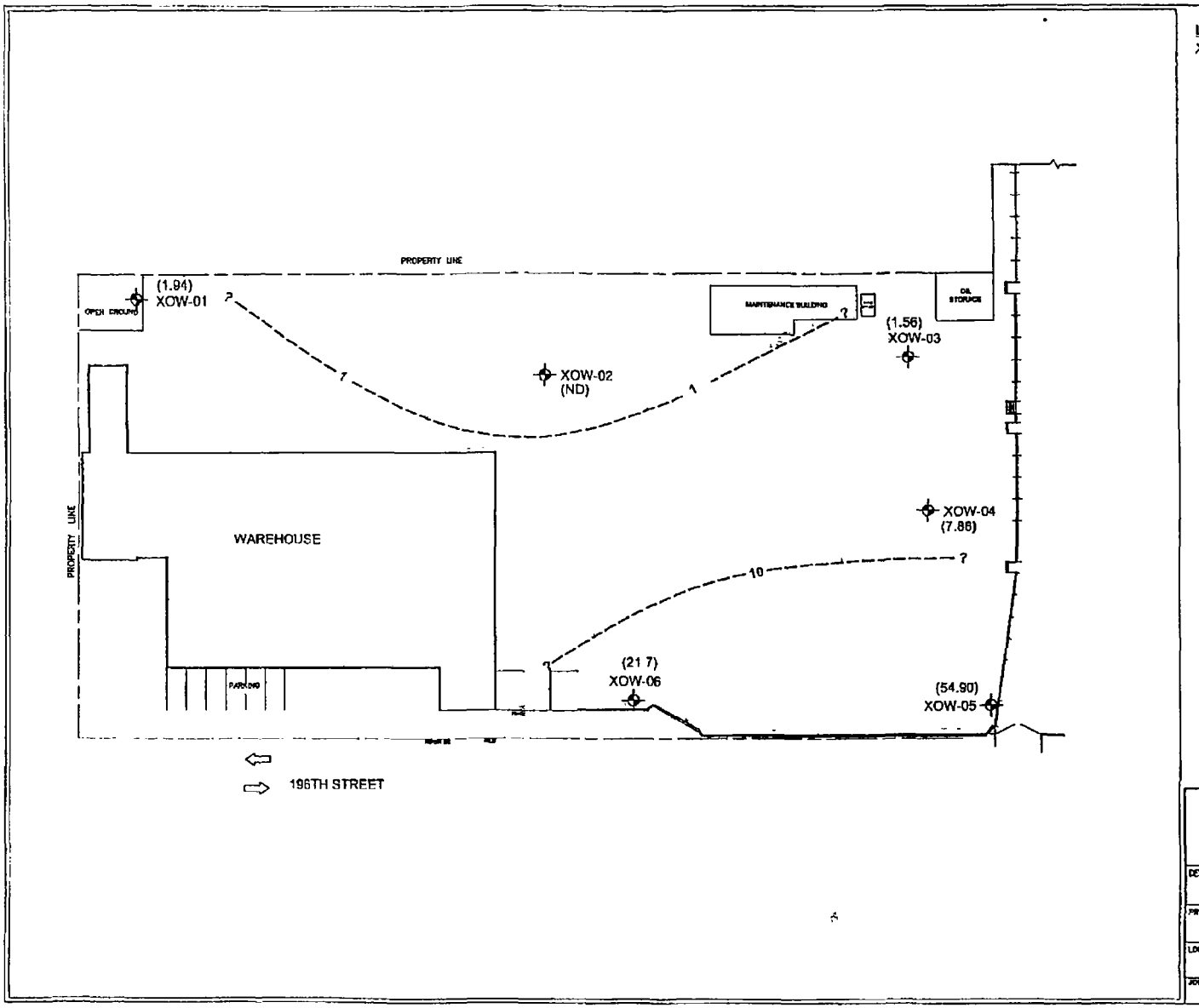
N

0 40

WINEFIELD & ASSOCIATES
ENVIRONMENTAL AND SAFETY CONSULTANTS

DESCRIPTION	GROUNDWATER SAMPLE ANALYSES MAP FOR 1,1-DICHLOROETHANE 4TH QUARTER 2005
PROJECT	AMERICAN POLYSTYRENE CORPORATION TORRANCE, CALIFORNIA
LOCATION	1225 W. 196TH STREET TORRANCE, CALIFORNIA
JOB NO	APC-04-071
DATE	1/5/2006
FIGURE NO.	2

BPACC01674



LEGEND

XOW-01 — GROUNDWATER MONITORING WELL

(ND) — 1,1-DICHLOROETHENE (1,1-DCE) CONCENTRATION (µg/l)

--- 10 — 1,1-DCE ISO-CONCENTRATION CONTOUR

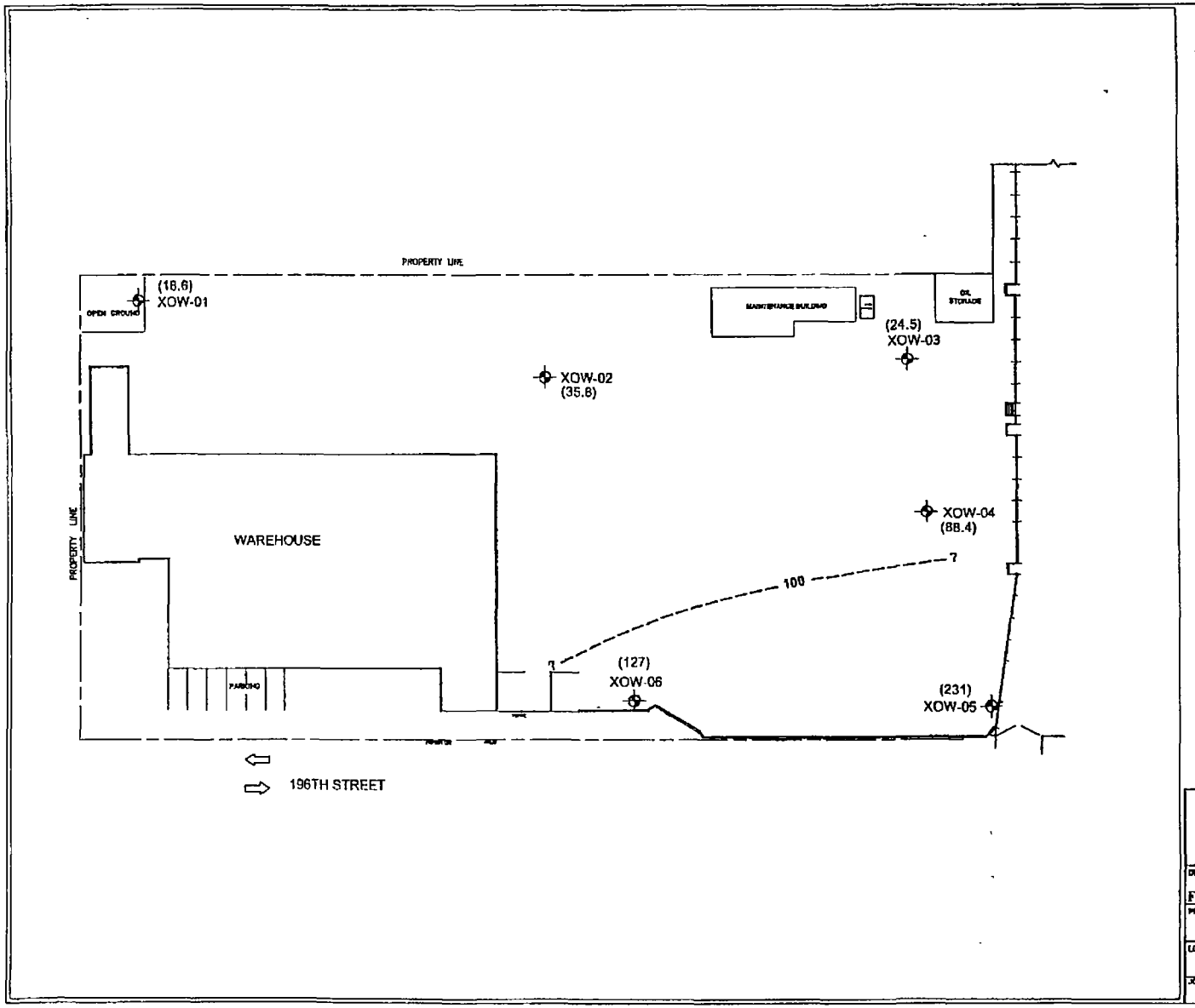
ND = NOT DETECTED AT LABORATORY DETECTION LIMIT

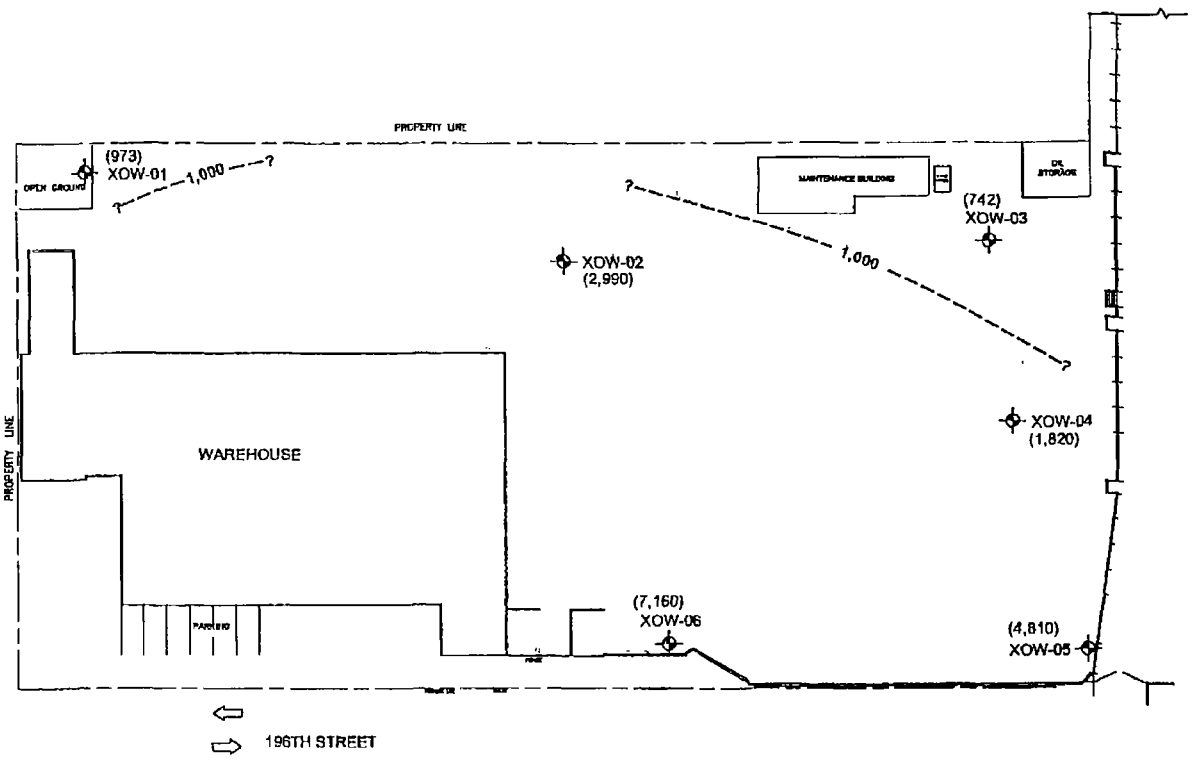
N

0 40

WINEFIELD & ASSOCIATES
ENVIRONMENTAL AND SAFETY CONSULTANTS

DESCRIPTION	GROUNDWATER SAMPLE ANALYSES MAP FOR 1,1--DICHLOROETHENE 4TH QUARTER 2005		
PROJECT	AMERICAN POLYSTYRENE CORPORATION TORRANCE, CALIFORNIA		
LOCATION	1225 W. 196TH STREET TORRANCE, CALIFORNIA		
JOB NO.	APC--04--071	DATE 1/5/2006	FIGURE NO. 3


PROPERTY LINE
(16.6)
XOW-01
OPEN GROUND
MAINTENANCE BUILDING
OIL STORAGE
(24.5)
XOW-03
XOW-02
(35.8)
XOW-04
(88.4)
WAREHOUSE
PROPERTY LINE
100
7
(127)
XOW-06
(231)
XOW-05
PARKING
196TH STREET
LEGEND
XOW-01 GROUNDWATER MONITORING WELL
(ND) cis 1,2-DICHLOROETHENE (1,1-DCE) CONCENTRATION (µg/l)
---100 1,2-DCE ISO-CONCENTRATION CONTOUR
N
0
40
WINEFIELD & ASSOCIATES
ENVIRONMENTAL AND SAFETY CONSULTANTS
DESCRIPTION GROUNDWATER SAMPLE ANALYSES MAP
FOR cis 1,2 DICHLOROETHENE 4TH QUARTER 2005
PROJECT AMERICAN POLYSTYRENE CORPORATION
TORRANCE, CALIFORNIA
LOCATION 1225 W. 196TH STREET
TORRANCE, CALIFORNIA
JOB NO. APC-04-071
DATE 1/5/2006
FIGURE NO. 4



LEGEND

XOW-01	GROUNDWATER MONITORING WELL
(1,040)	TRICHLOROETHENE (TCE) CONCENTRATION (µg/l)
1,000	TCE ISO-CONCENTRATION CONTOUR

N

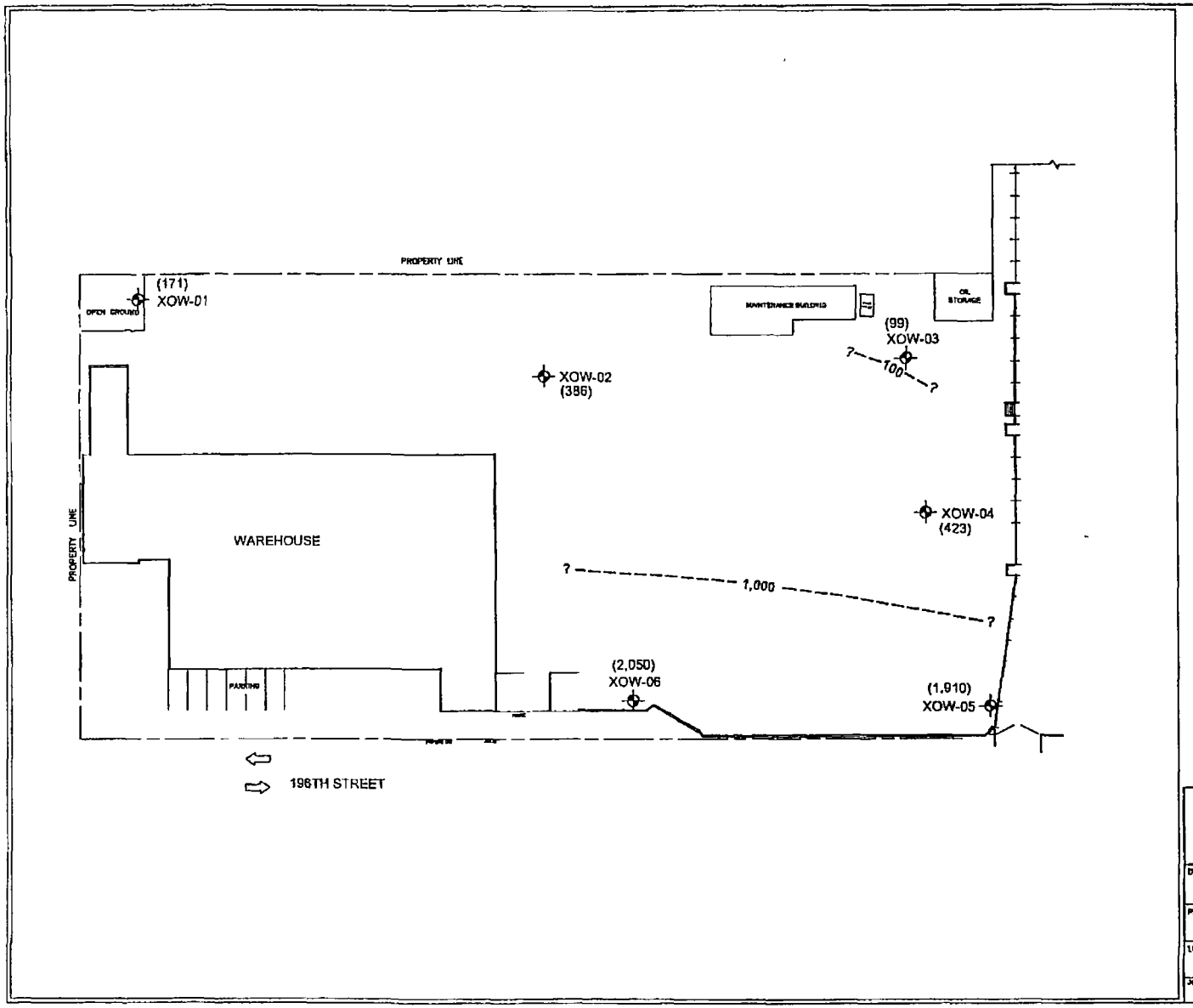
0 40

WINEFIELD & ASSOCIATES
ENVIRONMENTAL AND SAFETY CONSULTANTS

DESCRIPTION	GROUNDWATER SAMPLE ANALYSES MAP FOR TRICHLOROETHENE 4TH QUARTER 2005
PROJECT	AMERICAN POLYSTYRENE CORPORATION TORRANCE, CALIFORNIA
LOCATION	1225 W. 196TH STREET TORRANCE, CALIFORNIA

JOB NO.	DATE	FIGURE NO.
APC-04-071	1/5/2006	5

BPACC01677


PROPERTY LINE
(171)
XOW-01
OPEN GROUND
MAINTENANCE BUILDING
OIL STORAGE
(99)
XOW-03
XOW-02
(386)
100
?
?
XOW-04
(423)
PROPERTY LINE
WAREHOUSE
?
1,000
?
(2,050)
XOW-06
PARKING
(1,910)
XOW-05
196TH STREET
LEGEND
XOW-01
GROUNDWATER MONITORING WELL
(62)
TETRACHLOROETHENE (PCE) CONCENTRATION (µg/l)
1,000
PCE ISO-CONCETRATION CONTOUR
N
0
40
WINEFIELD & ASSOCIATES
ENVIRONMENTAL AND SAFETY CONSULTANTS
DESCRIPTION
GROUNDWATER SAMPLE ANALYSES MAP
FOR TETRACHLOROETHENE 4TH QUARTER 2005
PROJECT
AMERICAN POLYSTYRENE CORPORATION
TORRANCE, CALIFORNIA
LOCATION
1225 W. 196TH STREET
TORRANCE, CALIFORNIA
JOB NO.
APC-04-071
DATE
1/5/2006
FIGURE NO.
6

Appendix 2

Groundwater Analysis and Gauging Results (Table 1)

Historical Groundwater Analysis and Gauging Results (Table 2)

TABLE 1
GROUNDWATER ANALYSES AND GAUGING RESULTS, 4th QUARTER 2004
AMERICAN POLYSTYRENE CORPORATION
1225 W. 196th STREET
TORRANCE, CALIFORNIA

	Physical Parameters				VOCs (µg/L)					Metals (mg/L)				
WELL ID	WELL ELEVATION (feet, MSL)	DATE MEASURED	Depth to Groundwater (fbce)	Groundwater Elevation (ft MSL)	1,2-Dichloroethane	1,1-Dichloroethane	Trichloroethene	Tetrachloroethene	Total 1,2-dichloroethene	Barium	Chromium	Copper	Lead	Mercury
XOW-01	46.62	12/20/05	58 07	-11.45	1 94	2 82	18 60	973	171	nd	5.30	5.80	0.80	nd
XOW-02	45.40	12/20/05	56.88	-11.48	nd	1 80	35.80	2,990	386	50.70	50.00	15.80	1.30	nd
XOW-03	44.32	12/20/05	55.76	-11.44	1 56	1.30	24.50	742	99	7.09	12 00	2.60	0.50	nd
XOW-04	44 94	12/20/05	56.45	-11 51	7 86	2.28	88.40	1,820	423	7.56	15 00	5.60	0 90	nd
XOW-05	43.65	12/20/05	55.26	-11 61	54.90	4.73	231.00	4,810	1,910	53.20	98.00	26.60	6.00	nd
XOW-06	45.42	12/20/05	57.03	-11 61	21.70	4.10	127.00	7,160	2,050	43 70	45.00	10.00	0 70	nd
Laboratory Detection Limits					0.5	0.5	0.5	10.0	10.0	0.01	4.00	3.00	1.00	2.00
Primary MCLs					5.0	5.0	5.0	5.0	6.0	1.0	50	1.3	15	2

NOTES:
µg/L Micrograms per liter.
nd: Not detected at laboratory detection limit
MCL Maximum contamination levels for primary drinking water standards
fbce Feet below casing elevation.
MSL Mean sea level
–. Not established

TABLE 2
HISTORIC GROUNDWATER ANALYSES and GAUGING RESULTS
AMERICAN POLYSTYRENE CORPORATION
1225 W. 196th STREET
TORRANCE, CALIFORNIA

Physical Parameters					VOCs (µg/L)																									Metals (µg/L)				
Well ID	Well Elevation	Date Measured	Depth to Groundwater (feet)	Groundwater Elevation (ft. MSL)	Dichlorofluoro methane (Freon 21)	Trichlorofluoro methane (Freon 11)	1,1 Dichloroethene	trans 1 2 DCE	1,1 Dichloroethane	cis 1,2-Dichloroethene	Chloroform	Carbon Tetrachloride	Benzene	1 2 DCA	1 1 2 TCA	Trichloroethene	Dichlorobromo methane	Toluene	1 1 2 TCA	Tetrachloroethene	Dibromochloro methane	Chloro benzene	Ethyl benzene	Xylenes	1,2,5 Trimethyl benzene	1,3,4 Trimethyl benzene	1,3 Dichloro benzene	1,4 Dichloro benzene	n Butyl benzene	1,2 Dichloro benzene	Freon 12	Naphthalene	Hex-Chromium	Chromium	Copper	Lead	Mercury
XOW-01	46 62	12/20/05	58.07	-11.45	24 6	10 7	1.94	7 88	2.82	18.6	20.9	nd	nd	nd	nd	973	nd	23	nd	171	nd	nd	9 73	37.7	1.07	6 04	nd	nd	nd	nd	nd	1.81	nd	5.3	5.8	0.8	nd
XOW-01	46 62	09/22/05	58.28	-11 66	2.88	3.98	0 98	2.72	1.04	5.03	11.6	nd	nd	nd	nd	1,040	nd	nd	nd	135	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	2.3	0.4	nd
XOW-01	46 62	06/21/05	58.72	-12.10	6 08	8 42	1 72	6.39	2.34	23.9	16.9	nd	nd	nd	nd	785	nd	nd	nd	132	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
XOW-01	46 62	03/24/05	59.16	-12.54	nd	nd	2 69	4.59	1.73	5.8	15.9	nd	nd	nd	nd	1,000	nd	nd	nd	103	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.06	11	5	nd	0.48
XOW-01	46 62	11/01/04	59.80	-13 18	nd	nd	3.38	5.46	2.24	5.96	17.4	nd	nd	nd	nd	874	nd	nd	nd	232	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
XOW-01	46 62	07/29/04	59.73	-13 11	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	622	nd	nd	nd	62	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	5	nd	nd
XOW-01	46.62	01/26/04	--	--	nd	12	3.9	8.7	3	14	21	nd	20	nd	nd	1,300	nd	nd	nd	170	nd	nd	0 67	0.19	nd	nd	nd	nd	nd	nd	5.3	nd	nt	nt	nt	nt	nt
Laboratory Detection Limits					1 00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	0.50	1 00	0 50	0.50	0.50	0.50	1.00	1 00	0.50	0.50	0.50	1.00	0.50	0.50	1 00	0 01	4.00	3.00	1.00	2.00
DHS Primary MCLs					--	--	6	10	5	6	100	0.5	1	0.5	5	5	--	150	5	5	100	70	300	1,750	--	--	--	5	260	600	--	--	--	50	1,300	15	2

Notes:
µg/L Micrograms per liter
Bold: Values in bold exceed their respective MCL
nd: Not detected at laboratory detection limits shown
nt: Not tested
--: Not reported, or not determined

TABLE 2
HISTORIC GROUNDWATER ANALYSES and GAUGING RESULTS
AMERICAN POLYSTYRENE CORPORATION
1225 W. 196th STREET
TORRANCE, CALIFORNIA

Physical Parameters					VOCs (µg/L)																										Metals (µg/L)				
Well ID	Well Elevation	Date Measured	Depth to Groundwater (feet)	Groundwater Elevation (ft. MSL)	Dichlorodifluoro methane (Freon 21)	Trichlorofluoro methane (Freon 11)	1,1 Dichloroethene	trans 1 2 DCE	1,1 Dichloroethane	cis 1,2-Dichloroethene	Chloroform	Carbon Tetrachloride	Benzene	1 2 DCA	1 1 1 TCA	Trichloroethene	Dichlorobromo methane	Toluene	1 1 2 TCA	Tetrachloroethene	Dibromochloro methane	Chloro benzene	Ethyl benzene	Xylenes	1,3,5 Trimethyl benzene	1,2,4 Trimethyl benzene	1,3 Dichloro benzene	1,4 Dichloro benzene	n Butyl benzene	1,2 Dichloro benzene	Freon 12	Naphthalene	Hex-Chromium	Chromium	Copper	Lead	Mercury
XOW-02	45 40	12/20/05	56 88	-11 48	41.2	6 33	nd	5 42	1 8	35.8	17.3	nd	nd	nd	nd	2,990	nd	12	nd	386	nd	nd	5.54	21.45	nd	3.68	nd	nd	nd	nd	nd	1.12	50.7	50	15.8	1.3	nd
XOW-02	45.40	09/22/05	57 18	-11 78	5 2	6 64	1 88	3 55	1.34	17.7	18.6	nd	nd	nd	nd	2,570	nd	nd	nd	256	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	22.6	121	80.8	13	0.29
XOW-02	45 40	06/21/05	57.53	-12.13	9.3	9 43	nd	3.55	1.46	30.8	15	nd	nd	nd	nd	2,240	nd	nd	nd	291	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	23.4	25 6	nd	nd	nd
XOW-02	45.40	03/24/05	57 93	-12 53	nd	nd	nd	1 08	nd	6.3	6.52	nd	nd	nd	nd	1,610	nd	nd	nd	120	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	9.74	18	4.5	nd	0.25
XOW-02	45 40	11/01/04	58 75	-13 35	nd	nd	nd	0 91	nd	12.7	10.2	nd	nd	nd	nd	1,200	nd	nd	nd	310	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	13	63	6.2	nd
XOW-02	45 40	07/29/04	58 60	-13.20	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	801	nd	nd	nd	148	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0 12	33	39	8	nd
XOW-02	45.40	01/26/04	--	--	nd	8.7	nd	4.5	1.7	37	19	nd	3.4	nd	nd	3,100	nd	nd	nd	410	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	5.4	nd	nt	nt	nt	nt	nt
Laboratory Detection Limits					1.00	0 50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	0.50	1.00	0.50	0.50	0.50	0.50	1.00	1.00	0.50	0.50	0.50	1.00	0.50	0.50	1.00	0 01	4.00	3.00	1.00	2.00
DHS Primary MCLs					--	--	6	10	5	6	100	0.5	1	0.5	5	5	--	150	5	5	100	70	300	1,750	--	--	--	5	260	600	--	--	--	50	1,300	15	2

Notes
µg/L. Micrograms per liter
Bold Values in bold exceed their respective MCL
nd. Not detected at laboratory detection limits shown
nt: Not tested.
--. Not reported, or not determined

TABLE 2
HISTORIC GROUNDWATER ANALYSES and GAUGING RESULTS
AMERICAN POLYSTYRENE CORPORATION
1225 W. 196th STREET
TORRANCE, CALIFORNIA

Physical Parameters					VOCs (µg/L)																											Metals (µg/L)				
Well ID	Well Elevation	Date Measured	Depth to Groundwater (Dtw)	Groundwater Elevation (ft. MSL)	Dichlorofluoro methane (Freon 21)	Trichlorofluoro methane (Freon 11)	1,1 Dichloroethene	trans 1 2 DCE	1,1 Dichloroethane	cis 1,2-Dichloroethene	Chloroform	Carbon Tetrachloride	Benzene	1 2 DCA	1 1 2 TCA	Trichloroethene	Dichlorobromo methane	Toluene	1 1 2 TCA	Tetrachloroethane	Dibromochlorom ethane	Chloro benzene	Ethyl benzene	Xylenes	1,3,5 Trimethyl benzene	1,2,4 Trimethyl benzene	1,3 Dichloro benzene	1,4 Dichloro benzene	n Butyl benzene	1,2 Dichloro benzene	Freon 12	Napthalene	Hex-Chromium	Chromium	Copper	Lead	Mercury
XOW-03	44.32	12/20/05	55.76	-11.44	6.22	1.67	1.56	nd	1.3	24.5	7.2	nd	nd	nd	nd	742	nd	4.6	nd	99	nd	nd	2.35	9.28	nd	1.84	nd	nd	nd	nd	nd	nd	7.09	12	2.6	0.5	nd
XOW-03	44.32	09/22/05	55.90	-11.58	2.32	2.53	2.77	nd	1.26	20.5	11.6	nd	nd	nd	nd	522	nd	nd	nd	174	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	7.48	14	5.1	1.5	0.14
XOW-03	44.32	06/21/05	56.30	-11.98	2.57	2.17	2.07	nd	1.7	34.8	8.31	nd	nd	nd	nd	924	nd	nd	nd	146	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	7.06	8.9	nd	nd	nd
XOW-03	44.32	03/24/05	56.70	-12.38	nd	nd	2.26	nd	1.2	17.7	8.94	nd	nd	nd	nd	1,260	nd	nd	nd	159	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	7.58	11	2.2	nd	nd
XOW-03	44.32	11/01/04	57.64	-13.32	nd	nd	2.78	nd	1.04	29.2	13	nd	nd	nd	nd	1,300	nd	nd	nd	280	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	22	16	nd	nd
XOW-03	44.32	07/29/04	57.50	-13.18	nd	nd	nd	nd	nd	24	nd	nd	nd	nd	nd	1,290	nd	nd	nd	139	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	8.3	18	12	5	nd
XOW-03	44.32	01/26/04	--	--	nd	2.4	1.8	nd	2.3	19	8.2	nd	94	nd	nd	1,100	nd	1	nd	130	nd	nd	9.7	3.3	nd	0.46	nd	nd	nd	nd	2.1	nd	nt	nt	nt	nt	nt
Laboratory Detection Limits					1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	0.50	1.00	0.50	0.50	0.50	0.50	1.00	1.00	0.50	0.50	0.50	1.00	0.50	0.50	1.00	0.01	4.00	3.00	1.00	2.00
DHS Primary MCLs					--	--	6	10	5	6	100	0.5	1	0.5	5	5	--	150	5	5	100	70	300	1,750	--	--	--	5	260	600	--	--	--	50	1,300	15	2

Notes.
µg/L: Micrograms per liter
Bold. Values in bold exceed their respective MCL
nd. Not detected at laboratory detection limits shown.
nt: Not tested.
--: Not reported, or not determined

TABLE 1
HISTORIC GROUNDWATER ANALYSES and GAUGING RESULTS
AMERICAN POLYSTYRENE CORPORATION
1225 W. 190th STREET
TORRANCE, CALIFORNIA

Physical Parameters					VOCs (µg/L)																											Metals (µg/L)				
Well ID	Well Elevation	Date Measured	Depth to Groundwater (Dtw)	Groundwater Elevation (ft. MSL)	Dichlorofluoromethane (Freon 21)	Trichlorofluoromethane (Freon 11)	1,1 Dichloroethene	trans 1 2 DCE	1,1 Dichloroethane	cis 1,2-Dichloroethene	Chloroform	Carbon Tetrachloride	Benzene	1 2 DCA	1 1 2 TCA	Trichloroethene	Dichlorobromomethane	Toluene	1 1 2 TCA	Tetrachloroethene	Dibromochloromethane	Chlorobenzene	Ethyl benzene	Xylenes	1,3,5 Trimethyl benzene	1,2,4 Trimethyl benzene	1,3 Dichlorobenzene	1,4 Dichlorobenzene	n Butyl benzene	1,2 Dichlorobenzene	Freon 12	Naphthalene	Hex-Chromium	Chromium	Copper	Lead	Mercury
XOW-04	44.94	12/20/05	56.45	-11.51	10.4	2.61	7.86	nd	2.28	88.4	16.9	nd	nd	0.81	nd	1,810	nd	9.2	1.3	423	nd	nd	4.89	18.94	nd	3.45	nd	nd	nd	nd	nd	1.13	7.56	15	5.6	0.9	nd
XOW-04	44.94	09/22/05	56.61	-11.67	1.3	1.7	10.7	nd	1.88	59.9	27.3	nd	nd	nd	nd	1,540	nd	nd	nd	347	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	7.47	7.8	1.8	0.3	nd
XOW-04	44.94	06/22/05	57.07	-12.13	2.16	1.8	4.4		1.64	67.1	12.1	nd	nd	nd	nd	1,050	nd	nd	nd	261	nd	nd	nd	nd	nd	nd	nd	nd	n	nd	nd	nd	7.26	10.5	nd	nd	nd
XOW-04	44.94	03/24/05	57.43	-12.49	nd	nd	13	nd	1.42	46.7	18	nd	nd	nd	nd	1,790	nd	nd	nd	422	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	7.81	11	2.8	nd	nd
XOW-04	44.94	11/01/04	58.32	-13.38	nd	nd	10	nd	1.71	82	30.8	nd	nd	nd	nd	2,520	nd	nd	nd	885	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	16	18	13	2.8
XOW-04	44.94	07/29/04	58.25	-13.31	nd	nd	nd	nd	nd	99.1	nd	nd	nd	nd	nd	2,520	nd	nd	nd	476	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	6.81	12	4	3	nd
XOW-04	44.94	01/26/04	--	--	nd	3.4	6	1.2	2.5	83	16	nd	0.38	nd	nd	2,000	nd	nd	2	400	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	3.4	nd	nt	nt	nt	nt	nt
Laboratory Detection Limits					1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	0.50	1.00	0.50	0.50	0.50	0.50	1.00	1.00	0.50	0.50	0.50	0.50	1.00	0.50	0.50	1.00	0.01	4.00	3.00	1.00	2.00
DHS Primary MCLs					--	--	6	10	5	6	100	0.5	1	0.5	5	5	--	150	5	5	100	70	300	1,750	--	--	--	5	260	600	--	--	--	50	1,300	15	2

Notes.
µg/L: Micrograms per liter
Bold Values in bold exceed their respective MCL
nd. Not detected at laboratory detection limits shown.
nt. Not tested
-- Not reported, or not determined

TABLE 2
HISTORIC GROUNDWATER ANALYSES and GAUGING RESULTS
AMERICAN POLYSTYRENE CORPORATION
1225 W. 190th STREET
TORRANCE, CALIFORNIA

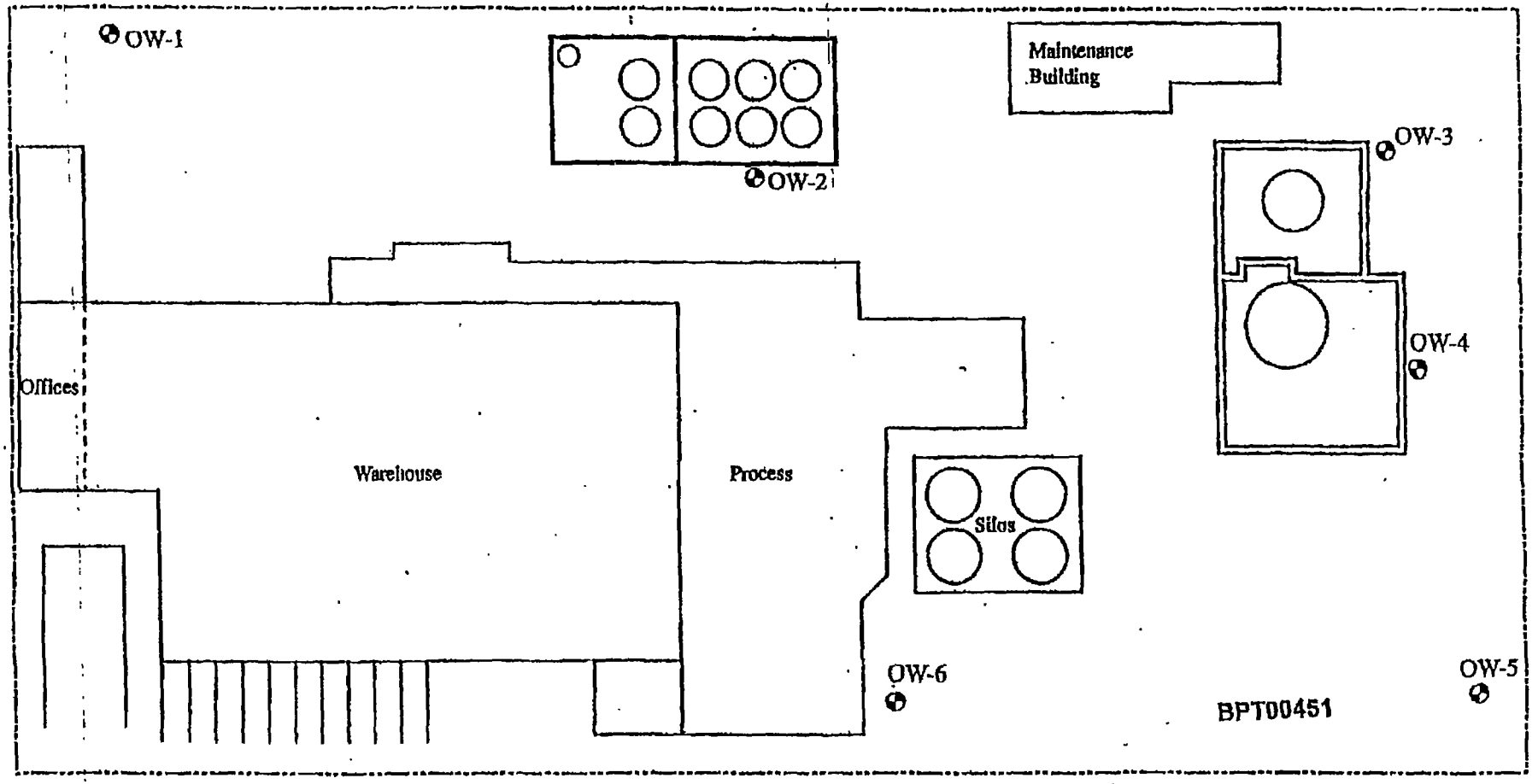
Physical Parameters					VOCs (µg/L)																											Metals (µg/L)				
Well ID	Well Elevation	Date Measured	Depth to Groundwater (Dtw)	Groundwater Elevation (ft. MSL)	Dichlorofluoromethane (Freon 21)	Trichlorofluoromethane (Freon 11)	1,1 Dichloroethene	trans 1 2 DCE	1,1 Dichloroethane	cis 1,2-Dichloroethene	Chloroform	Carbon Tetrachloride	Benzene	1 2 DCA	1 1 2 TCA	Trichloroethene	Dibromochloromethane	Toluene	1 1 2 TCA	Tetrachloroethene	Dibromochloromethane	Chlorobenzene	Ethyl benzene	Xylenes	1,3,5 Trimethyl benzene	1,2,4 Trimethyl benzene	1,3 Dichlorobenzene	1,4 Dichlorobenzene	n Butyl benzene	1,2 Dichlorobenzene	Freon 12	Naphthalene	Hex-Chromium	Chromium	Copper	Lead	Mercury
XOW-05	43 65	12/20/05	55.26	-11 61	19.1	3.5	54.9	nd	4.73	231	24 2	0 61	2.09	0.67	nd	4,810	nd	9.6	nd	1,910	nd	nd	5.14	20.15	nd	3.68	nd	nd	nd	nd	nd	1.13	53.2	98	26.6	6	nd
XOW-05	43 65	09/22/05	55 43	-11 78	nd	5 14	14.2	nd	2 72	101	29.9	2 11	nd	nd	nd	3,990	nd	nd	nd	1,720	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	43.3	152	21	5	0.22
XOW-05	43 65	06/21/05	55.87	-12.22	nd	nd	3.63	nd	1 4	113	11.6	nd	nd	nd	nd	1,400	nd	nd	nd	841	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	2.89	39.3	24.2	9.6	nd
XOW-05	43 65	03/24/05	56.25	-12.60	nd	nd	30.1	nd	2.3	85.1	23.4	nd	nd	nd	nd	3,880	nd	nd	nd	1,340	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	26.5	254	41.5	17	0.3
XOW-05	43 65	11/01/04	57 18	-13.53	nd	nd	23.6	0.85	2.87	83.8	31.3	nd	nd	nd	nd	3,830	nd	nd	nd	1,890	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	53	25	8.3	nd
XOW-05	43 65	07/29/04	57 12	-13 47	nd	nd	nd	nd	nd	83.8	nd	nd	nd	nd	nd	3,060	nd	nd	nd	1,540	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	5.42	11	nd	2	nd
XOW-05	43 65	01/26/04	--	--	nd	4.2	36	1.7	3.9	190	22	0.75	2	nd	nd	6,400	0.76	nd	nd	2,300	nd	0.56	nd	nd	nd	nd	nd	0.4	nd	0.52	nd	nd	nt	nt	nt	nt	nt
Laboratory Detection Limits					1 00	0.50	0.50	0.50	0.50	0.50	0 50	0.50	0.50	0.50	1 0	0.50	0.50	0.50	1 00	0.50	0.50	0.50	0.50	1.00	1.00	0.50	0.50	0.50	1.00	0.50	0.50	1.00	0.01	4.00	3 00	1.00	2.00
DHS Primary MCLs					--	--	6	10	5	6	100	0.5	1	0.5	5	5	--	150	5	5	100	70	300	1,750	--	--	--	5	--	600	--	--	--	50	1,300	15	2

Notes:
µg/L: Micrograms per liter
Bold. Values in bold exceed their respective MCL
nd: Not detected at laboratory detection limits shown
nt Not tested
-- Not reported, or not determined

TABLE 2
HISTORIC GROUNDWATER ANALYSES and GAUGING RESULTS
AMERICAN POLYSTYRENE CORPORATION
3225 W. 190th STREET
TORRANCE, CALIFORNIA

Physical Parameters					VOCs (µg/L)																											Metals (µg/L)				
Well ID	Well Elevation	Date Measured	Depth to Groundwater (fbge)	Groundwater Elevation (ft. MSL)	Dichlorofluoromethane (Freon 21)	Trichlorofluoromethane (Freon 11)	1,1 Dichloroethene	trans 1 2 DCE	1,1 Dichloroethane	cis 1,2-Dichloroethene	Chloroform	Carbon Tetrachloride	Benzene	1 2 DCA	1 1 2 TCA	Trichloroethene	Dichlorobromomethane	Toluene	1 1 2 TCA	Tetrachloroethene	Dibromochloromethane	Chloro benzene	Ethyl benzene	Xylenes	1,3,5 Trimethyl benzene	1,2,4 Trimethyl benzene	1,3 Dichloro benzene	1,4 Dichloro benzene	n Butyl benzene	1,2 Dichloro benzene	Freon 12	Naphthalene	Hex-Chromium	Chromium	Copper	Lead	Mercury
XOW-06	45 42	12/20/05	57 03	-11 61	29 6	7.88	21.7	3.1	4 1	127	41.3	0.77	8.88	0.53	nd	7,160	nd	17	nd	2,050	nd	nd	9.12	35 32	1.12	6.42	nd	nd	nd	3.32	nd	1.79	43.7	45	10	0.7	nd
XOW-06	45 42	09/22/05	57.25	-11.83	3 36	4.91	24 8	3.6	3.31	50.9	23.3	nd	nd	nd	nd	5,190	nd	nd	nd	1,390	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	45.9	46	2.5	0.3	nd
XOW-06	45.42	06/21/05	57.70	-12.28	6 02	5 83	20.8	1.78	6.42	208	61 9	nd	18	nd	nd	4,930	nd	nd	nd	2,450	nd	nd	nd	nd	nd	nd	nd	nd	10.2	nd	nd	nd	29.3	34 5	nd	nd	nd
XOW-06	45.42	03/24/05	58.10	-12 68	nd	nd	26.1	nd	5.57	125	79.1	nd	nd	nd	nd	12,300	nd	nd	nd	5,120	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	30.8	3[c]	3.3	nd	0.21
XOW-06	43.42	11/01/04	58 80	-13 38	nd	nd	29 2	3 58	5.81	121	75.6	nd	nd	nd	nd	10,800	nd	nd	nd	3,400	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	40	nd	nd	nd
XOW-06	45.42	07/29/04	58.80	-13.38	nd	nd	nd	nd	nd	134	nd	nd	nd	nd	nd	14,200	nd	nd	nd	4,200	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	29.2	38	13	3	nd
XOW-06	45 42	01/26/04	–	–	nd	8.2	22	5.6	5.9	250	74	0.74	15	nd	nd	12,000	0.77	nd	nd	4,000	0.56	0.47	nd	nd	nd	nd	0.88	1.2	nd	11	7.1	nd	nt	nt	nt	nt	nt
Laboratory Detection Limits					1.00	0.50	0 50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	1.0	0.50	0.50	0.50	1.00	0.50	0.50	0.50	0.50	1.00	1.00	0.50	0.50	0.50	1.00	0.50	0.50	1.00	0 01	4.00	3.00	1.00	2.00
DHS Primary MCLs					–	–	6	10	5	6	100	0.5	1	0.5	5	5	–	150	5	5	100	70	–	1,750	330	–	–	5	–	600	–	–	–	50	1,300	15	2

Notes
µg/L: Micrograms per liter
Bold Values in bold exceed their respective MCL
nd Not detected at laboratory detection limits shown
nt Not tested
–, Not reported, or not determined



N

0 40 80

Scale in feet

OW-3 Monitoring Well

Monitoring Well Locations

Amoco Chemical Company
Polystyrene Facility
1225 West 196th Street
Torrance, California

May, 1992

Attachment 4

Analytical Results for Groundwater Samples
Amoco Chemical Company
Polystyrene Facility, Torrance, California

Well No.	Date	1,1 D C E	1,2 D C E	T C E	P C E	M Cl	1,1-D C A
OW-1	2/1/90	<0.080	<0.080	1.0	<0.080	10	<0.080
	2/21/90	<1.5	<1.5	2.2	<1.5	190	<1.5
	12/5/90	<1.0	<1.0	2.0	<1.0	320	<1.0
	6/20/91	<5.0	<5.0	<5.0	<5.0	1,100	<5.0
	1/16/92	0.008	0.060	2.2	0.19	1.000	<0.003
OW-2	2/1/90	<0.004	<0.004	0.500/0.625	0.050/0.068	<0.020	<0.004
	2/21/90	<0.005	0.006	1.1	0.16	<0.025	<0.005
	12/5/90	<0.010	0.056	3.0	0.42	<0.050	<0.010
	6/20/91	<0.020	0.050/<0.020	2.7/2.7	0.41/0.39	<0.10	<0.020
	1/16/92	<0.003	0.030/0.032	2.7/2.7	0.46/0.39	0.93/0.025	<0.003
OW-3	2/1/90	<0.015	0.054	1.7	0.24	<0.075	<0.015
	2/21/90	0.035	0.15	3.8	1.1	<0.10	<0.020
	12/5/90	<0.020	0.073	2.6	0.29	<0.10	<0.020
	6/20/91	<0.020	<0.020	1.9	0.27	<0.10	<0.020
	1/16/92	0.008	0.059	3.2	0.43	0.007	<0.003
OW-4	2/1/90	0.017	0.064	1.4	0.31	<0.050	<0.010
	2/21/90	<0.015	0.087	3.4	0.40	<0.075	<0.015
	12/5/90	0.046/0.064	0.33/0.33	7.2/7.2	1.6/1.6	<0.125	<0.025
	6/20/91	<0.050	0.36	7.8	1.0	<0.250	<0.050
	1/16/92	0.033	0.18	5.5	1.3	0.005	<0.003
OW-5	2/1/90	0.063	0.20	5.8	1.6	<0.20	<0.040
	2/21/90	0.13/0.10	0.38/0.38	15/16	5.9/5.1	<0.40	<0.080
	12/5/90	<0.10	0.67	21	8.1	<0.50	<0.10
	6/20/91	<0.20	0.90	15	6.6	<1.0	<0.20
	1/16/92	0.15	0.56	14	5.0	0.006	0.010
OW-6	2/1/90	0.021	0.021	1.9	0.78	<0.075	<0.015
	2/21/90	0.056	0.059	7.8	3.3	<0.040	<0.04
	12/5/90	<0.10	0.27	27	11	<0.10	<0.10
	6/20/91	<0.20	<0.20	22	10	<1.0	<0.20
	1/16/92	0.13	0.30	21	9.4	<0.005	0.011

- Laboratory reported no volatile organic compounds in samples collected November, 1988
- Concentrations reported in milligrams per liter (ppm)
- Elevated detection limits caused by dilution in laboratory

0.13/0.10 = Original sample results/duplicate sample results
<0.020 = Not detected at or above concentration indicated

DCE = dichloroethene
TCE = trichloroethene
PCE = tetrachloroethene
MCl = methylene chloride
DCA = dichloroethane

BPT00452

Attachment 5

Analytical Results for Groundwater Samples
Amoco Chemical Company
Polystyrene Facility, Torrance, California

Well No.	Date	Benzene	Ethyl-benzene	Total Xylenes	Toluene	Chloro-benzene	Chloroform
OW-1	2/1/90	<0.080	<0.080	<0.080	<0.16	<0.080	<0.080
	2/21/90	<1.5	<1.5	<1.5	<3.0	<1.5	<1.5
	12/5/90	<1.0	<1.0	<1.0	<2.0	<1.0	<1.0
	6/20/91	<5.0	<5.0	<5.0	<10	<5.0	<5.0
	1/16/92	0.003	0.005	0.014	0.004	<0.003	0.037
OW-2	2/1/90	<0.004	<0.004	<0.004	<0.008	<0.004	<0.004
	2/21/90	<0.005	<0.005	<0.005	<0.010	<0.005	<0.005
	12/5/90	<0.010	<0.010	<0.010	<0.020	<0.010	0.025
	6/20/91	<0.020	<0.020	<0.020	<0.040	<0.020	<0.020
	1/16/92	<0.003	<0.003	<0.003	<0.003	<0.003	0.011/0.013
OW-3	2/1/90	<0.015	<0.015	<0.015	<0.030	<0.015	<0.015
	2/21/90	<0.020	<0.020	<0.020	<0.040	<0.020	<0.020
	12/5/90	<0.020	<0.020	<0.020	<0.040	<0.020	<0.020
	6/20/91	<0.020	<0.020	<0.020	<0.040	<0.020	<0.020
	1/16/92	<0.003	<0.003	<0.003	<0.003	<0.003	0.008
OW-4	2/1/90	<0.010	<0.010	<0.010	<0.020	<0.010	<0.010
	2/21/90	<0.015	<0.015	<0.015	<0.030	<0.015	<0.015
	12/5/90	<0.025	<0.025	<0.025	<0.050	<0.025	<0.025
	6/20/91	<0.050	<0.050	<0.050	<0.10	<0.050	<0.050
	1/16/92	0.007	<0.003	<0.003	<0.003	<0.003	0.019
OW-5	2/1/90	<0.040	<0.040	<0.040	<0.080	<0.040	<0.040
	2/21/90	<0.080	<0.080	<0.080	<0.16	<0.080	<0.080
	12/5/90	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
	6/20/91	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
	1/16/92	0.022	<0.003	<0.003	<0.003	<0.003	0.034
OW-6	2/1/90	<0.015	<0.015	<0.015	<0.030	<0.015	<0.015
	2/21/90	<0.04	<0.04	0.21	<0.080	2.8	<0.04
	12/5/90	<0.10	<0.10	<0.10	<0.20	<0.10	<0.10
	6/20/91	<0.20	<0.20	<0.20	<0.40	<0.20	<0.20
	1/16/92	0.028	<0.003	<0.003	<0.003	<0.003	0.069

- Laboratory reported no volatile organic compounds in samples collected November, 1988
- Concentrations reported in milligrams per liter (ppm)
- Elevated detection limits caused by dilution in laboratory

0.13/0.10 = Original sample results/duplicate sample results
<0.020 = Not detected at or above concentration indicated

DCE = dichloroethene
TCE = trichloroethene
PCE = tetrachloroethene
MCl = methylene chloride
DCA = dichloroethane

BPT00453

Attachment 5

JANUARY, 1992
GROUNDWATER SAMPLING
AND ANALYSIS REPORT
AMOCO CHEMICAL COMPANY
TORRANCE, CALIFORNIA

March 11, 1992

Simon Hydro-Search
5882 Bolsa Avenue
Huntington Beach, California 92649

Project No. 512-345

GROUNDWATER LABORATORY ANALYTICAL RESULTS

TABLE 1

Report: JANUARY, 1992 BIANNUAL GROUNDWATER MONITORING REPORT
Client: AMOCO
Facility: AMOCO Chemical Company
Location: 1225 West 190th Street/Normandie
City: Torrance, California

SIMON Hydro-Search
Project: 512-345
Contract: NA
Date: 11-Mar-92

SAMPLE DESCRIPTION | LABORATORY RESULTS — ND = Not Detected above limit shown, NA = Not Analyzed, Unregulated = Monitoring Required per CADHS, Not Listed = No CADHS Levels Established

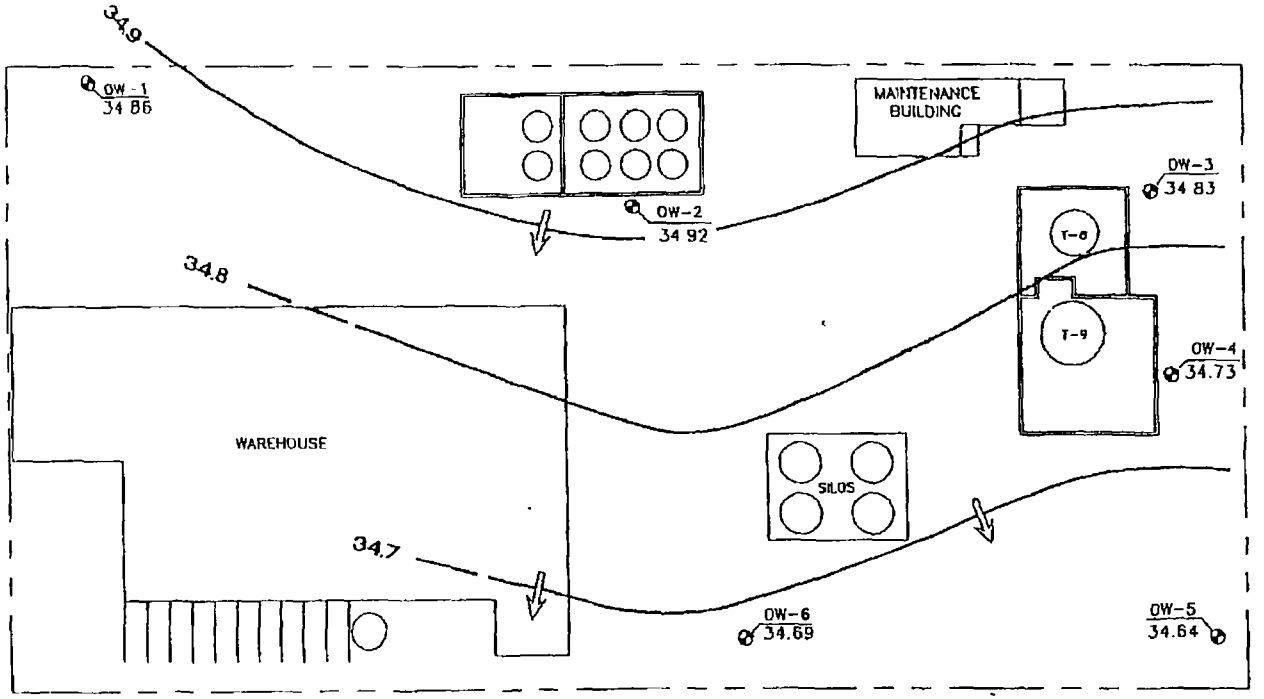
Sample Date	Well/Sample Name	Benzene EPA 624 (ug/l)	Chloroform EPA 624 (ug/l)	1,2-Dichloro benzene EPA 625 (ug/l)	1,1-Dichloro ethane EPA 624 (ug/l)	1,1-Dichloro ethene EPA 624 (ug/l)	cis-1,2-Dichloro ethene EPA 624 (ug/l)	trans-1,2-Dichloro ethene EPA 624 (ug/l)	Ethyl benzene EPA 624 (ug/l)	Methylene Chloride EPA 624 (ug/l)	Tetrachloro ethene EPA 624 (ug/l)	Toluene EPA 624 (ug/l)	1,1,2-Tri chloro ethane EPA 624 (ug/l)	Trichloro ethene EPA 624 (ug/l)	Trichloro fluoro methane EPA 624 (ug/l)	Xylenes Total EPA 624 (ug/l)	All Other Semi-Volatile Compounds EPA 625 (ug/l)
CADHS MCL as of 18 OCT 90		1	unregulated	unregulated	5	6	6	10	680	unregulated	5	unregulated	32	5	150	1,750	
CADHS AL as of 18 OCT 90			not listed	130						40		100					
01/16/92	OW-00 field blank	ND<3	ND<3	ND<5	ND<3	ND<3	ND<3	ND<3	ND<3	ND<5	ND<3	ND<3	ND<5	ND<3	ND<10	ND<3	none detected
01/16/92	OW-01	3	37	ND<5	ND<3	8	80	ND<3	5	1,000,000	190	4	8	2,200	ND<10	14	none detected
01/16/92	OW-02	ND<3	11	ND<5	ND<3	ND<3	23	7	ND<3	830	460	ND<3	ND<5	2,700	17	ND<3	none detected
01/16/92	OW-02 Duplicate	ND<3	13	ND<5	ND<3	ND<3	24	8	ND<3	25	390	ND<3	ND<5	2,700	18	ND<3	none detected
01/16/92	OW-03	ND<3	8	ND<5	ND<3	8	59	ND<3	ND<3	7	430	ND<3	ND<5	3,200	ND<10	ND<3	none detected
01/16/92	OW-04	7	19	ND<5	ND<3	33	190	ND<3	ND<3	5	1,300	ND<3	ND<5	5,500	ND<10	ND<3	none detected
01/16/92	OW-05	22	34	ND<5	10	150	580	ND<3	ND<3	8	5,500	ND<3	ND<5	14,000	14	ND<3	none detected
01/16/92	OW-06	28	69	5	11	130	300	ND<3	ND<3	ND<5	9,400	ND<3	ND<5	21,000	ND<10	ND<3	none detected

TABLE 2

MEASURED GROUNDWATER ELEVATIONS

Well Casing	Casing Elevation (Assumed)	Groundwater Elevation January 16, 1992	Groundwater Elevation June 25, 1992	Change in Elevation
OW-1	100.86	34.86	35.41	-0.55
OW-2	99.63	34.93	35.23	-0.30
OW-3	98.56	34.84	35.24	-0.40
OW-4	99.19	34.73	35.13	-0.40
OW-5	97.99	34.65	35.06	-0.41
OW-6	99.67	34.69	35.07	-0.38

NOTE: Elevation in Feet



EXPLANATION

OW-3 / 34 83 — MONITORING WELL NUMBER / GROUNDWATER ELEVATION (feet)

34.7 — GROUNDWATER ELEVATION CONTOUR (dashed where inferred)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE:

1. Data collected Jan. 16, 1992.
2. Contour intreval = 0 10 feet

N

0 60 120

SCALE IN FEET
1" = 60'

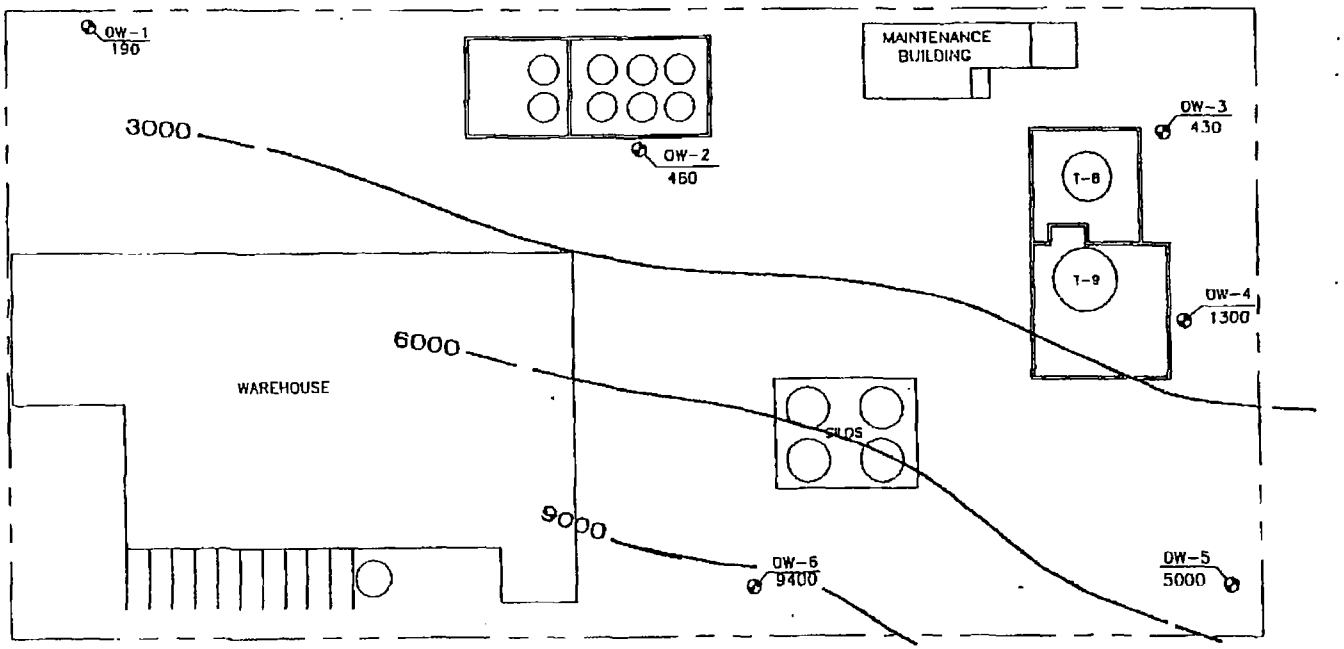
GROUNDWATER ELEVATION CONTOUR MAP
AMOCO CHEMICAL COMPANY
TORRANCE, CALIFORNIA

SIMON HYDRO-SEARCH
5882 BOLSA AVENUE
HUNTINGTON BEACH, CALIFORNIA 92649

PROJECT NO:	DWG NO	FIGURE:
512-345	345001	2
DATE: JANUARY, 1992	REV. 2/21/92	

BPACC01693

BPT00338



EXPLANATION

OW-3 MONITORING WELL NUMBER

430 TETRACHLOROETHYLENE CONCENTRATION (ug/L)

3000 TETRACHLOROETHYLENE CONTOUR (Dashed where inferred)

1. Data collected Jan. 16, 1992
2. Contour interval = 3000 ug/L.

N

0 60 120

SCALE IN FEET
1" = 60'

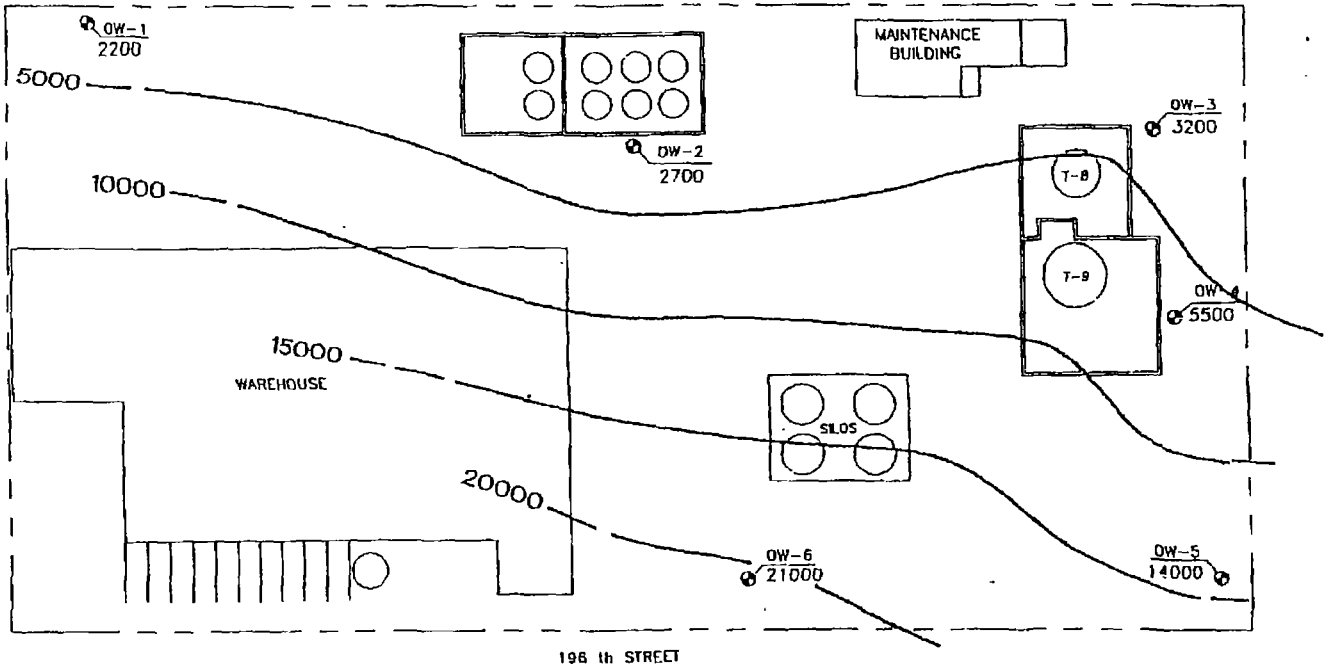
BPT00341

TETRACHLOROETHENE CONCENTRATION MAP
AMOCO CHEMICAL COMPANY
TORRANCE, CALIFORNIA

SIMON HYDRO-SEARCH
5882 BOLSA AVENUE
HUNTINGTON BEACH, CALIFORNIA 92649

PROJECT NO:	DWG NO:	FIGURE:
512-345	345001	5
DATE: JANUARY, 1992	REV 2/21/92	

BPACC01694



EXPLANATION

OW-3 MONITORING WELL NUMBER

1900 TRICHLOROETHENE CONCENTRATION (ug/L)

5000 TRICHLOROETHENE CONTOUR (Dashed where inferred)

1. Data collected Jan. 16, 1992.

2 Contour Interval = 5000 ug/L.

N

0 60 120

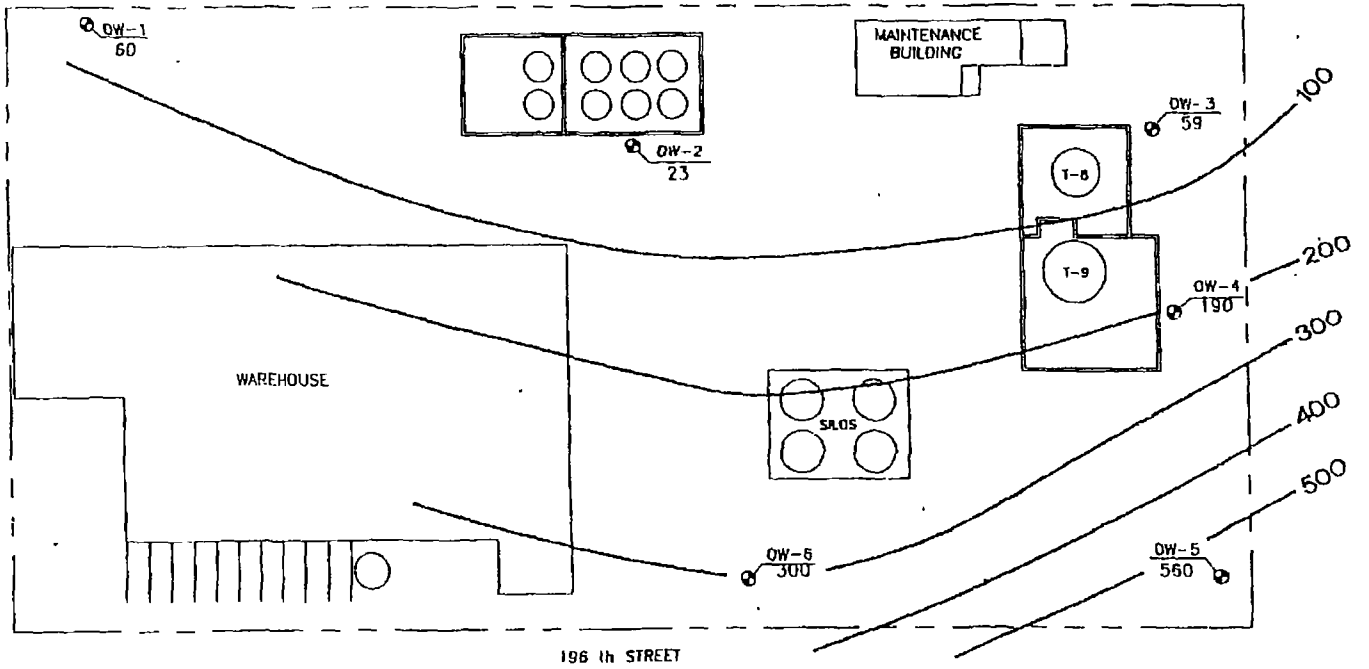
SCALE IN FEET
1" = 60'

BPT00340

TRICHLOROETHENE CONCENTRATION MAP
AMOCO CHEMICAL COMPANY
TORRANCE, CALIFORNIA

SIMON HYDRO-SEARCH
5882 BOLSA AVENUE
HUNTINGTON BEACH, CALIFORNIA 92649

PROJECT NO	DWG NO	FIGURE
512-345	345001	4
DATE: JANUARY, 1992	REV 2/21/92	



EXPLANATION

OW-3 MONITORING WELL NUMBER

59 CIS-1,2 DICHLOROETHENE CONCENTRATION (ug/L)

500 CIS- 1,2 DICHLOROETHENE CONTOUR (Dashed where inferred)

NOTE. 1 Data collected Jan. 16, 1992

2 Contour Interval = 100(ug/l)

N

0 60 120

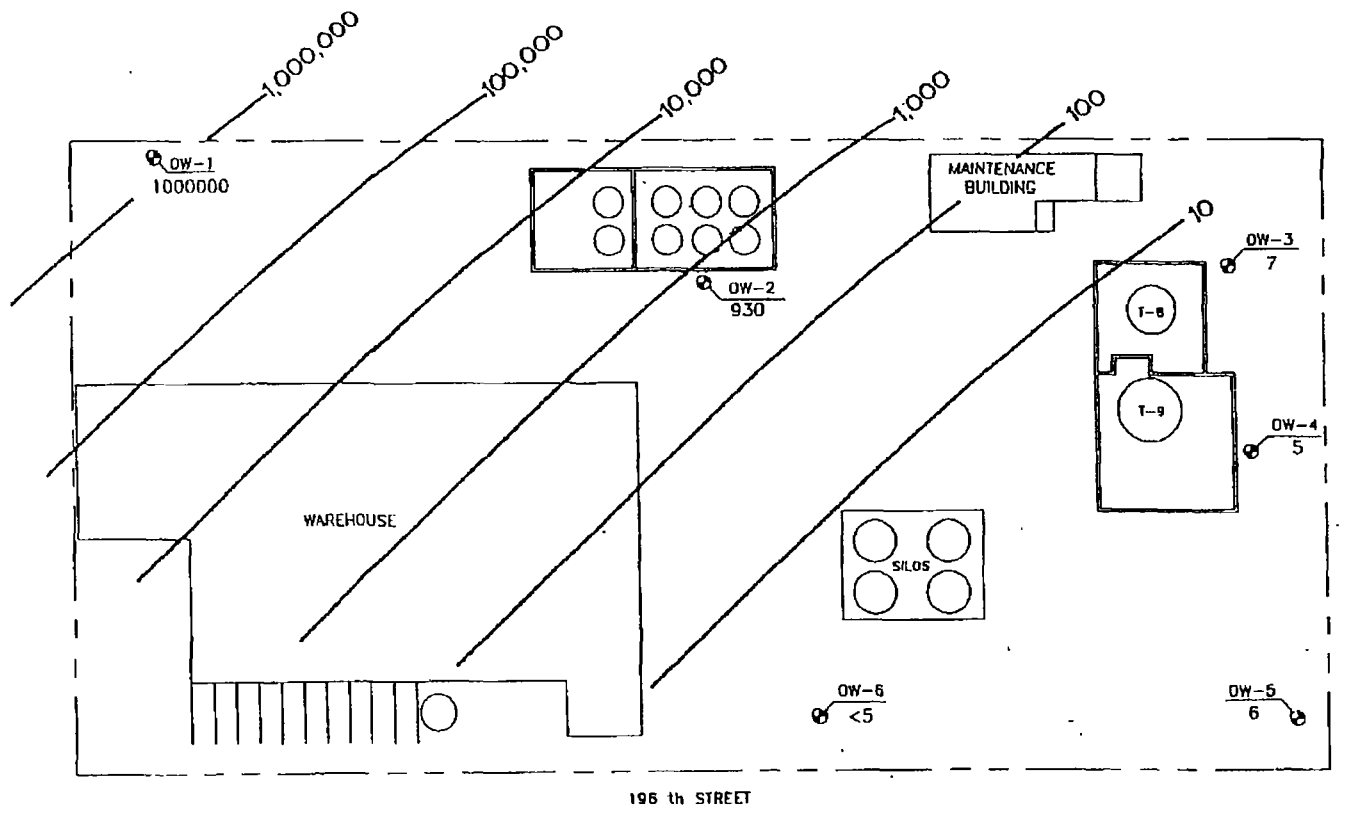
SCALE IN FEET
1" = 60'

BPT00339

CIS - 1,2 DICHLOROETHENE
CONCENTRATION MAP
AMOCO CHEMICAL COMPANY
TORRANCE, CALIFORNIA

SIMON HYDRO-SEARCH
5882 BOLSA AVENUE
HUNTINGTON BEACH, CALIFORNIA 92649

PROJECT NO	DWG NO	FIGURE
512-345	345001	3
DATE: JANUARY, 1992	REV 2/21/92	



EXPLANATION

OW-3 / 7 — MONITORING WELL NUMBER; METHYLENE CHLORIDE CONCENTRATION (ug/l)

10 — METHYLENE CHLORIDE CONTOUR (Dashed where inferred)

NOTE: 1. Data collected Jan 16, 1992.
2. <5 = not detected above limit shown.

N

0 60 120

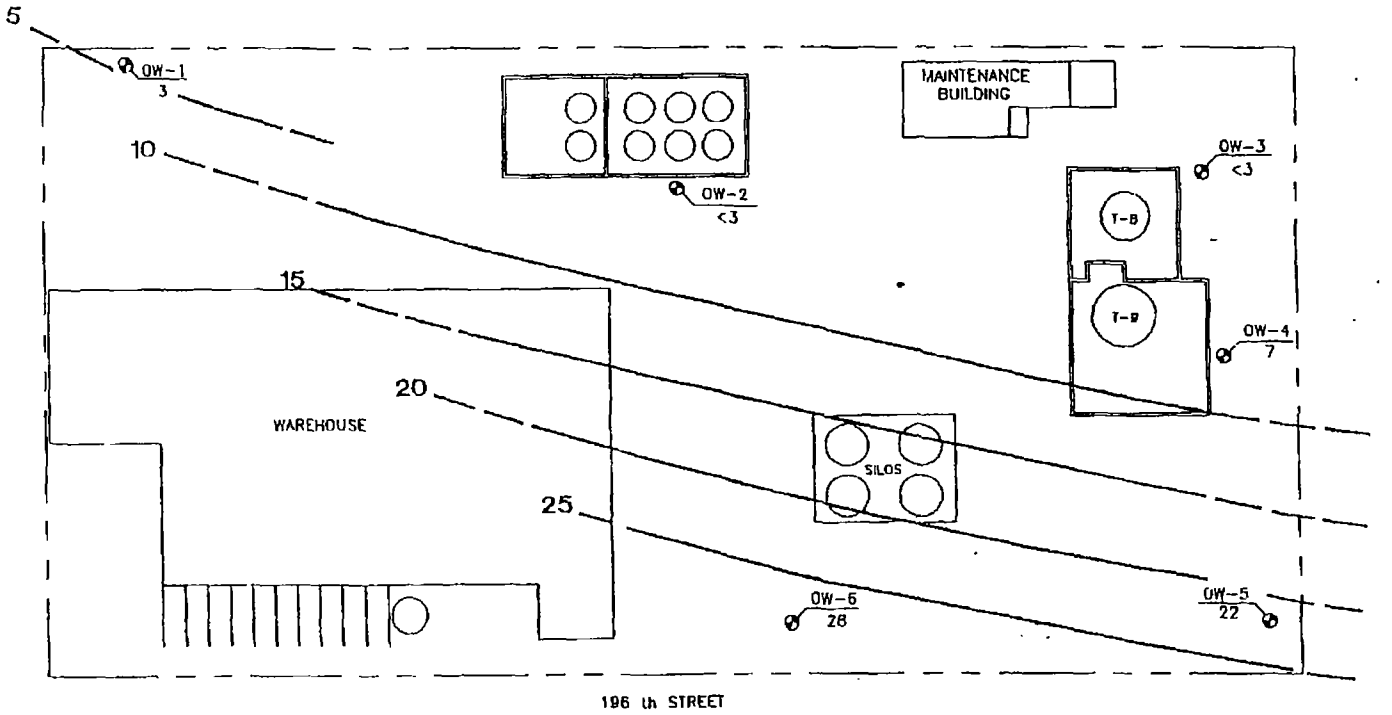
SCALE IN FEET
1" = 60'

BPT00342

METHYLENE CHLORIDE CONCENTRATION MAP
AMOCO CHEMICAL COMPANY
TORRANCE, CALIFORNIA

SIMON HYDRO-SEARCH
5882 BOLSA AVENUE
HUNTINGTON BEACH, CALIFORNIA 92649

PROJECT NO.	DWG NO:	FIGURE:
512-345	345001	6
DATE: JANUARY, 1992	REV 2/21/92	



EXPLANATION

OW-3 MONITORING WELL NUMBER
BENZENE CONCENTRATION (ug/l)

5 BENZENE CONTOUR
(Dashed where inferred)

NOTE. 1 Data collected Jan 16, 1992

2. Contour interval = 5 ug/l.

3. < 3 = not detected above limit shown.

N

0 60 120

SCALE IN FEET
1" = 60'

BPT00343

BENZENE CONCENTRATION MAP
AMOCO CHEMICAL COMPANY
TORRANCE, CALIFORNIA

SIMON HYDRO-SEARCH
5882 BOLSA AVENUE
HUNTINGTON BEACH, CALIFORNIA 92649

PROJECT NO.	DWG NO.	FIGURE
512-345	345001	7
DATE: JANUARY, 1992	REV. 2/21/92	

BPACC01698

EEI ENGINEERING ENTERPRISES, INC.

WATER RESOURCES SPECIALISTS

6695 E. Pacific Coast Highway Long Beach, CA 90803 213-430-6500

May 29, 1990

Amoco Chemical Company
1225 West 196th Street
Torrance, California 90502

Attention: Mr. Jeff Campbell
Process Engineer

Subject: Report of Additional Subsurface Assessment and Groundwater Sampling
Amoco Chemical Facility
1225 West 196th Street
Torrance, California
Project No. 512-345

Dear Mr. Campbell:

Presented herewith is the report of subsurface assessment and groundwater sampling performed by Engineering Enterprises, Inc. (EEI). This assessment was performed at the request of Amoco, Inc. to evaluate the presence of styrene, ethylbenzene and associated chemicals in two boreholes and six groundwater monitoring wells at the subject site.

We trust this report meets your current requirements. Should you have questions regarding the results contained herein, or require further clarification, please contact us. We appreciate the opportunity to be of continued service to Amoco.

Respectfully,

William E. Halbert
Project Hydrogeologist

WEH:weh

BPT00126

REPORT OF ADDITIONAL SUBSURFACE ASSESSMENT AND GROUNDWATER SAMPLING AMOCO CHEMICAL FACILITY 1225 WEST 196TH STREET TORRANCE, CALIFORNIA

Prepared for:

Amoco Chemical Company
1225 West 196th Street
Torrance, California 90502

Submitted by:

Engineering Enterprises, Inc.
6695 East Pacific Coast Highway
Long Beach, California 90803
213/430-6500

William E. Halbert
Project Hydrogeologist

Robert T. Bean
Registered Geologist #1339
CEG #483

BPT00127

EEI ENGINEERING ENTERPRISES, INC.

respectively. Methylene chloride was reported only in the water sample collected from well OW-1 at a concentration of 10,000 ug/L. Presented in Table 2 are the reported concentrations for detected compounds. Appendix C, Part 2, contains the laboratory reports from the first groundwater analytical event. A relative groundwater elevation contour map for this sampling event is presented in Figure 3. Concentration maps for PCE, TCE and 1,2-dichloroethene are presented in Figures 4, 5 and 6, respectively.

TABLE 2

LABORATORY RESULTS - GROUNDWATER SAMPLING
DATE 2-1-90(a)

Compound	Monitoring Well No.						
	OW-1	OW-2	OW-22 (Duplicate of OW-2)	OW-3	OW-4	OW-5	OW-6
1,1-DCE(b)	ND80(c)	ND4	ND5	ND15	17	63	21
1,2 DCE (Total)	ND80	ND4	ND5	54	64	200	21
Methylene Chloride	10000	ND20	ND25	ND75	ND50	ND200	ND75
TCE(d)	1000	500	625	1700	1400	5800	1900
PCE(e)	ND80	50	68	240	310	1600	780

(a) Concentrations in micrograms per liter.
(b) DCE = Dichloroethene.
(c) ND = Not detected above concentration shown.
(d) TCE = Trichloroethene.
(e) PCE = Tetrachloroethene.

Groundwater samples were collected during a second sampling event (2-21-90) to confirm detections reported in the first event (2-1-90). In general, reported concentrations from the second sampling and analytical event were at least twice the concentrations reported from the first event. Compounds detected in the second sampling event but not the first include chlorobenzene and total xylenes at 2,800 ug/L and 210 ug/L respectively in the sample from well OW-6. Reported concentrations from the second sampling event are presented in Table 3, below. A relative groundwater elevation contour map for the second sampling event is presented in Figure 7. Concentration maps for PCE, TCE and 1,2-dichloroethene are presented in Figures 8, 9 and 10, respectively. Laboratory reports are contained in Appendix C, Part 3.

TABLE 3

LABORATORY RESULTS - GROUNDWATER SAMPLING
DATE 2-21-90(a)

Compound	Monitoring Well No.						
	OW-1	OW-2	OW-3	OW-4	OW-5	OW-22 (Duplicate of OW-5)	OW-6
Methylene Chloride	190000	ND25(b)	ND100	ND75	ND400	ND500	ND200
1,1-DCE(c)	ND1500	ND5	35	ND15	130	100	56
1,2-DCE (Total)	ND1500	6	150	87	380	380	59
TCE(d)	2200	1100	3800	3400	15000	16000	7800
PCE(e)	ND1500	160	1100	400	5900	5100	3300
Chlorobenzene	ND1500	ND5	ND20	ND15	ND80	ND100	2800
Xylenes	ND1500	ND5	ND20	ND15	ND80	ND100	210

(a) Concentrations reported in micrograms per liter.
(b) ND = Not detected above concentration shown.
(c) DCE = Dichloroethene.
(d) TCE = Trichloroethene.
(e) PCE = Tetrachloroethene.

BPT00145

EEI ENGINEERING ENTERPRISES, INC.

ATTACHMENT D

Historical Boring Logs

American Polystyrene Corporation Facility
1225 West 196th Street
Torrance, California
SECOR Project No. 37BP.XB010.03

SUMMARY OF SUBSURFACE CONDITIONS

Boring Number	Depth (feet)	Field Vapor Reading (ppm)	Soil Description
B-1	0-1	110	SILTY SAND: dark grey; very fine some silt; trace clay; slightly moist
	1-2	40	
	2-3	42	
	3-4	4.5	greenish brown; little silt
	4-5	4.2	
B-2	0-1	16	SILTY SAND: dark grey; very fine to fine; little silt; dry
	1-2	0.8	
	2-3	0.8	
B-3	0-1	300	SILTY SAND: reddish brown; very fine to fine; some silt; trace clay; slightly moist
	1-2	310	
	2-3	20	green to greenish grey; little silt
	3-4	18	
	4-5	11	
B-4	0-1	360	SILTY SAND: dark grey; very fine to fine; some silt; trace clay; slightly moist
	1-2	620	
	2-3	240	greenish grey; little silt; dry
	3-4	120	
	4-5	30	
B-5	0-1	400	SILTY SAND: dark grey; very fine to fine; some silt; trace clay; slightly moist
	1-2	200	
	2-3	40	greenish grey; little silt; dry
	3-4	36	
	4-5	20	

BORING: EEI-1	FILE NAME: EEI1
PROJECT NAME: AMOCO	PROJECT NO. 512-345
LOCATION/COORDINATES: East of Tank No. T-8	RIG TYPE: Soil Master
SCHEDULE / WATER LEVEL	SAMPLING METHOD: SS
INITIATED: 2-15-90 / DEPTH: NA	DRILLING CO: West Hazmat Drilling Corp.
COMPLETED: 2-15-90 / DATE: NA	DRILLED BY: M.Smith
BACKFILLED: 2-15-90 / TIME: NA	LOGGED BY: B.Charest
GROUND ELEVATION: -- / BORING DEPTH: 40'	SHEET 1 OF 2

DEPTH IN FEET	SAMPLE NUMBER	DEPTH	TYPE	BLOWS	PID ppm	OVA ppm	USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0					180	110			Cemented gravel to 1" diameter	
							CL		SILTY CLAY: Dark brown (10YR-2/2); slightly moist	
5					40	28			yellowish brown (10YR-5/6); slightly moist	
10					60	33				
15					64	44				
					0	0	-- SP		SAND: Light olive brown (2.5Y-5/4); fine little silt; trace coarse; slightly moist	
20	S-1-20		SS	33	13	5.8	-- CL		SILTY CLAY: Light olive brown (2.5YR-5/4) slightly moist	

BPACC01705

Denotes Laboratory Sample

EEI ENGINEERING ENTERPRISES, INC.

BORING: EEI-1 Cont. FILE NAME: EEI1-2

SHEET 2 OF 2

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	DEPTH	TYPE	BLOWS	PID ppm	OVA ppm	SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
25	S-1-25		SS	29	20	50	SM		SILTY SAND: Light olive brown (2.5YR-5/4); poorly sorted; slightly moist; trace mica	
30	S-1-30		SS	35	14	5.4	SP		SAND: Light olive brown (2.5YR-5/4); fine to coarse; poorly sorted; slightly moist; micaceous	
35	S-1-35		SS	47	5	1.6	ML		SILT: Light olive brown (2.5YR-5/4); clayey very fine sandy; low moisture; micaceous	
40	S-1-40		SS	47	3.5	2.6	SP		SAND: Pale yellow (5Y-7/3); silty very fine to fine; poorly sorted; slightly moist; trace mica	
45										
50										

BPACC01706

Denotes Laboratory Sample

EEI ENGINEERING ENTERPRISES, INC.

BORING: B-2			FILE NAME: B2
PROJECT NAME: AMOCO TORRANCE			PROJECT NO. 512-350
LOCATION/COORDINATES:			RIG TYPE: Soil Master
SCHEDULE	WATER LEVEL		SAMPLING METHOD: SH
INITIATED: 2-15-90	DEPTH: NA		DRILLING CO: West Hazmat
COMPLETED: 2-15-90	DATE: NA		DRILLED BY: M.Smith
BACKFILLED: 2-15-90	TIME: NA		LOGGED BY: T.Danaher
GROUND ELEVATION: NA	BORING DEPTH: 40'		SHEET 1 OF 2

DEPTH IN FEET	SAMPLE NUMBER	DEPTH	TYPE	BLOWS	PID ppm	USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0									
5	GS1-1-5		GS	NA	5	CL		CLAY: Dark greyish brown (10YR-4/2); little silt; trace fine sand; moist; medium stiff	
10	GS1-2-10		GS	NA	5			dark greyish brown (10YR-5/3); stiff	
15	GS1-3-15		GS	NA	3			dark yellowish brown (10YR-4/3); trace coarse sand	
						-- SM		SILTY SAND: Very dark greyish brown; graded; fine; little silt; little clay; moist; medium dense (est.)	
20	1-1-20		SS	29	0	-- SP		SAND: Light yellowish brown (2.5Y-6/4); poorly graded; fine; trace silt; moist; medium dense	

BPACC01707

EEI ENGINEERING ENTERPRISES, INC.

BORING: B-2 Cont. FILE NAME: B2-2

SHEET 2 OF 2

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	DEPTH	TYPE	BLOWS	PID ppm	SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
25	1-2-25		SH	28	3	ML		CLAYEY SILT: Light olive brown (2.5Y-5/4); some clay; slightly moist; very stiff	
30	1-3-30		SH	58	8	SP		SAND: Light olive brown (2.5Y-5/4); poorly graded; fine to medium; micaceous; trace silt; moist; very dense	
35	1-4-35		SH	24	4	ML		CLAYEY SILT: Light yellowish brown (2.5Y-6/4); little clay; trace fine sand; slightly moist; very stiff	
40	1-5-40		SH	44	2	SM		SILTY SAND: Light yellowish brown (2.5Y-5/4); poorly graded; fine; little silt; moist; hard	
45									
50									

BPACC01708

EEI ENGINEERING ENTERPRISES, INC.

ATTACHMENT E

Standard Operating Procedures for Soil and Groundwater Sampling

American Polystyrene Corporation Facility
1225 West 196th Street
Torrance, California
SECOR Project No. 37BP.XB010.03

STANDARD OPERATING PROCEDURES

SOP #1 LOCATING UNDERGROUND UTILITIES

Prior to the commencement of work on-site, SECOR will research the locations of known underground utilities with the assistance of Underground Service Alert (USA - Southern California toll free phone number 1-800-422-4133). USA will contact the owners of the various utilities in the vicinity of the site so that utility owners can mark the locations of their subsurface equipment and/or meet with a SECOR representative on site. An independent geophysical contractor will confirm the USA locations with a basic metal detector or geophysical survey. Prior to drilling, each boring will be advanced manually using a hand auger and/or post-hole digger to a minimum depth of five-feet to avoid contact with any and other unmarked subsurface structures or utilities. Whenever possible, the hand dug boring will equal the outer diameter of the rod used by the drilling rig.

SOP #2 SOIL VAPOR SURVEY INVESTIGAION

The following section describes *Soil Vapor Analysis* Investigation procedures to be utilized by SECOR personnel in the performance of the field sampling and testing tasks at the Gardena Sumps site in Gardena, CA. All field activities are to be performed under the direction of a SECOR California Registered Engineer or Geologist.

Probe Construction and Insertion (Manually-Driven Probes): Manually driven soil vapor probes are typically constructed of 0.625 inch outside diameter steel and are equipped with a hardened steel tip. The probes are nominally 5 feet long and can be threaded together to reach a depth of ten-feet below ground surface. An inert 1/8 inch nylaflow tube will be threaded down the center of the probe and connected to a sampling port just above the tip. This internal sample tubing design will eliminate any contact between the sample port and the gas sample. The probe will be driven into the ground by an electric rotary hammer. Once inserted to the desired depth, the probe will be rotated approximately three turns to open the tip and expose the vapor sampling ports. This design will prevent clogging of the sampling ports and cross-contamination from soils during insertion.

Hydraulically-Driven Probes: Hydraulically-driven soil vapor probes are typically constructed of either 1.25 or 1.5 inch outside diameter steel and equipped with a hardened drop-off steel tip. The probes are nominally four feet long and threaded together to reach multiple depths. The probe will be driven into the subsurface with a hydraulic ram (Geoprobe) direct-push system. Once inserted to the desired depth, the probe will be retracted slightly to expose the vapor sampling port. Small diameter inert tubing will be inserted through the center of the rod and threaded into a gas tight fitting just above the tip. After a sample is obtained the tubing will be removed and the probe rod will then be advanced to the next sampling depth or removed. This design will prevent clogging of the sampling port and cross-contamination from soils during insertion.

Surface Seals: The probe rod will be sealed at the surface with granular and hydrated bentonite for a minimum of 20 minutes before sampling.

Soil Gas Sampling: Soil vapor will be withdrawn from the end of the inert nylaflow tubing that runs from the sampling tip to the surface using a 20 to 60 cubic centimeter (cc) syringe or gas tight canister (Summa) connected via an on-off valve. The probe tip and sampling tubing will be nominally purged of three to five internal dead volumes, or based upon a pre-determined purge volume established by a purge volume test described below. A sample of in-situ soil vapor will then be withdrawn and immediately transferred to the mobile lab for analysis within minutes of collection. The use of small calibrated syringes allows for careful monitoring of purge and sample volumes. This procedure will ensure adequate sample flow is obtained without excessive pumping of air or introduction of surface air into the sample.

Purge Volume Test: If required, a Site specific purge volume test will be conducted at the beginning of the soil gas survey to purge ambient air from the sampling system. Three different volumes will be sampled (nominally one, three, and seven purge volumes) and analyzed immediately to determine the volume amount with the highest concentration. Therefore, the optimum purge volume will be achieved and used during the entire Site investigation.

Use of Tracer Compound to Ensure Probe Seal Integrity: A tracer compound, typically difluoroethane, iso-propanol, or butane, will be used to test for leaks around the probe barrel at the ground surface and in the sampling system. The tracer will be placed around the base of the probe barrel and at the top of the probe barrel during sample collection. If the tracer is detected per CA-EPA advisory specifications, another sample will be collected.

Sample Flow Rate: Sample collection will be timed so that the flow rate does not exceed 200 ml/per minute. This will be accomplished by withdrawing the plunger on the 60 cc syringe at a constant rate for 20 seconds. The collector will note the collection time on a logsheet, and also record any resistance to sample flow that is felt on the syringe during collection.

Summa Canister: Summa canisters will be connected to the end of the nylaflow tubing to the same three way valve used with the syringe. A choke will be placed on the canister to ensure that the flow rate is no more than 200 ml/ per minute into the summa canister.

Field Records: The field technician will maintain a logsheet summarizing:

- Sample identification
- Probe location
- Date and time of sample collection
- Sampling depth
- Identity of samplers
- Weather conditions
- Sampling methods and devices
- Soil gas purge volumes

- Volume of soil gas extracted
- Observation of soil or subsurface characteristics (any condition that affects sample integrity)
- Apparent moisture content (dry, moist or saturated etc.) of the sampling zone
- Chain-of-custody protocols and records used to track samples from sampling point to analysis

SOP #3 SOIL BORING INSTALLATION

The following section describes *Soil Boring Installation* procedures to be utilized by SECOR personnel in the performance of the field sampling and testing tasks. All field activities are to be performed under the direction of a SECOR California Registered Professional Engineer or Geologist.

Hollow-Stem Auger

Drilling and soil sampling will be conducted using a truck-mounted drill rig equipped with hollow-stem augers. All down-hole drilling equipment will be steam-cleaned prior to use and between each boring to reduce the chances of cross contamination. The split-barrel sampler will be washed in soap solution and double rinsed with tap and purified water between each sampling event to reduce the potential for cross contamination between samples. Hand augers will be washed in soap solution and double rinsed with tap and purified water between each sampling event to reduce the potential for cross contamination between samples during hand auger sampling.

Soil sampling will be performed in accordance with American Society for Testing and Materials Method 1586-84. Using this procedure a California-type sampler is driven into the soil every 5 vertical feet by a 140-pound weight falling 30 inches. Three 6-inch brass liners will be placed in the sampler for sample collection. The number of blow counts required to advance the sampler 18 inches will be recorded at each sample interval onto soil boring logs. An EPA Method 5035 approved sampling device (EnCore) will be utilized in collecting soil samples from the end of the lower-most intact brass ring. Each sample will then be labeled, identified on the chain of custody, and stored in an ice-filled cooler for transport to the laboratory. Remaining soil in the sampler will be used for later screening with a photo-ionization detector (PID) or equivalent equipment. The soil will be field screened by placing the soil in resealable plastic bags and allowed to reach ambient temperature. Headspace vapors in the bags will be field screened with a calibrated PID. The highest observed stable reading will then be recorded onto the boring log. Another portion of the soil sample will be used for lithologic classification and description by the United Soil Classification System.

Geoprobe

Drilling and soil sampling will be conducted with a direct-push hydraulic ram (Geoprobe) system. The Large Bore Sampler is assembled with a cutting shoe, retractable drive point and piston, drive head and the desired sample sleeves. A drive rod is added to the top of the sampler with an inner rod to insure the drive point and piston remain in place as the

assembly is advanced. The entire assembly is driven into the subsurface using the percussion of the direct push rig. By adding a series of hardened, hollow drive steel rods, the sampler containing either acetate, stainless steel, or brass sampling sleeves is advanced to the desired depth. As each drive rod is added, an inner rod is placed in the center of the drive rod to insure the drive point and piston remain in place. Once the desired depth is achieved, a final drive rod is added without the inner rod. This allows the drive point to retract into the sample tube as the sampler is advanced for one final push and the sample collects in the sleeve. The tool chain is then extracted from the boring and the sample sleeve is removed from the sample tube. An EPA Method 5035 approved sampling device (EnCore) is utilized for collecting soil samples directly from the sample sleeve acetate liner. After equipment decontamination, a new sleeve is placed in the sample tube and the procedure is repeated.

Waste Disposal

All soil cuttings and investigation derived wastes (IDW) generated during drilling activities will typically be placed in labeled, DOT-approved 55-gallon steel drums and stored on-Site pending analytical characterization. All waste will be properly disposed/recycled in accordance with all applicable Federal, State, and local regulations.

SOP #4 GEOLOGIC DATA COLLECTION

The following section describes *Geologic Data Collection* procedures to be utilized by SECOR personnel in the performance of the field sampling and testing tasks. All field activities are to be performed under the direction of a SECOR California Registered Professional Engineer or Geologist. Each geologic boring field log will included a description of the following:

- Earth materials, conditions, and classification of soils by the Unified Soil Classification System (USCS) according to ASTM Method D-2488 (ASTM, 1994);
- Soil structure and composition for paleodepositional analysis and hydrostratigraphic characterization;
- Type of sample, method of sample collection, and sample depths in feet below ground surface;
- Penetration in blows per six-inch drive length (blow counts) and sample recovery (length of recovered sample/actual drive length or percent recovery) for driven samples;
- For continuous cores, penetration in feet of sample recovered per core interval;
- Organic vapor readings using OVA field headspace screening methods (Field headspace screening will be conducted by placing a representative soil sample in a plastic bag and inserting the tip of the OVA into the bag to minimize potential loss of vapors during the measurement);
- Volume of de-ionized water added during drilling to help stabilize the borehole walls and minimize sloughing; and
- Well construction or boring abandonment details and materials.

Completed boring logs will be reviewed and signed by a State of California Registered Geologist. Additional field documentation may include but is not limited to a/an daily log of progress and events, tailgate safety meeting record, sample collection log, instrument calibration log, ambient air monitoring log, and Chain-of-Custody documents.

SOP #5 SOIL SAMPLE COLLECTION USING THE ENCORE™ SAMPLER

The EnCore™ is a single-use sampling system designed for collection and storage of soil samples. The system consists of a single-use EnCore™ Sampler and cap, both composed of non-reactive materials, and a re-usable stainless steel T-Handle. The top portion of the EnCore™ Sampler will be loaded into the T-Handle, plunger-end first, and secured with locking pins. Each sampler will be checked prior to use to ensure that the pins are locked and the sampler ready for use. The sampler will be pushed into the soil retained in stainless or brass sleeves or in acetate core-barrel liners using the T-Handle, until the inner "O"-ring is visible through the viewing hole in the side of the T-Handle. The cap will then be placed over the bottom end of the coring body and twisted until locked in place. The full, sealed sampler is then removed from the T-Handle by releasing the locking lever and placed in the appropriate zipper bag. This procedure will be repeated until a sample set consisting of six (6) identically labeled EnCore™ samplers are collected at each sample interval. The entire set will be placed in a re-sealable plastic bag and chilled in an ice cooled chest maintained at approximately 4◦C and the appropriate information will be recorded on the Chain-of-Custody documents. Following collection of soil samples, the re-usable stainless steel T-Handle will be decontaminated by washing with a solution of low-phosphate soap and tap water, a tap water rinse, and de-ionized water rinse.

To maintain efficient Site operations and minimize collection time, internal and exterior sample labels will be prepared to the extent possible and applied to the coring body and zipper bag, respectively, several days prior to use. After labeling, individual EnCore™ Samplers will be returned to their respective zipper bags, and each set of six samplers will be placed in sealed plastic bags. Bags containing the sampler sets will be stored in clean containers with custody seals affixed across the opening until use. Temporal information such as date, sampler I.D., and time of collection will be added to the exterior label immediately prior to, or after, sample collection.

SOP #6 WELL INSTALLATION

The following section describes *Well Installation* procedures to be utilized by SECOR personnel in the performance of the field sampling and testing tasks. The procedure provides guidelines for the installation of monitoring wells that can be utilized for monitoring of chemical conditions in groundwater, groundwater elevations, evaluating the properties of water-bearing strata, or remediation by extraction of vapor or fluids. Permits from the appropriate oversight Agencies must be obtained, as applicable, prior to installing groundwater wells. All field activities are to be performed under the direction of a SECOR California Registered Professional Engineer or Geologist.

Hollow-Stem Auger Drill Rig

The following section describes the standard field procedures used for the installation of wells using a continuous-flight, hollow-stem drilling rig. Drilling and soil sampling will be conducted in accordance with the SOPs for Clearance of Underground Utilities and Soil Boring Installation.

The well construction specifications are determined prior to the installation activities. These specifications include borehole diameter, casing diameter, screen diameter, screen length, filter pack size, sealing materials, and completion methods. The specifications are chosen based on the intended purpose of the well, compatibility with subsurface chemical and physical conditions, hydrogeologic characteristics, drilling methods, and compatibility with common surface activities.

Initially, a soil boring is advanced to target depth of the well. At the target depth, the well casing is placed within the augers and the filter pack is added as the augers are retracted from the borehole. Wells installed at depths significantly greater than 60 feet may require the use of centralizers to maintain plumbness to ensure proper installation of annular materials

Annular materials should be provided in factory packaging with certifications denoting the materials are free of contaminants. All annular materials are tremmied into place to ensure proper placement and to maintain the stability of the borehole wall. The filter pack consists of non-reactive, smooth, rounded, granular material, typically sand or gravel, of uniform size. As appropriate, sand is poured into the annular space to a minimum of 1 foot above the screened interval. Following placement of the well pack, each well is surged with a vented, non-reactive surge tool to ensure uniformity within the filter pack. Additional sand material may be added after surging to allow the sand pack to reach the targeted depth.

A sanitary or transition seal consisting of bentonite or other approved material hydrated with potable water is placed above the filter pack to maintain the integrity of the filter pack during the emplacement of the annular seal. A 1 to 2 hour waiting period is typically used to allow the bentonite to seal the annular space appropriately. The remainder of the annular space is backfilled with bentonite grout or a Portland cement/ bentonite grout mixture in compliance with State of California Guidelines. The well is completed in a manner that protects it from normal activities that occur in the immediate

vicinity. Protective measures may include placement of a traffic-rated vault or placement in a steel casing with protective steel posts.

The top of the well casing will be notched and permanently marked with the survey point upon which subsequent water measurements will be obtained. A licensed surveyor will obtain longitude and latitude measurements with a Global Positioning Satellite (GPS) instrument in accordance with Assembly Bill 2886.

All soil cuttings and investigation derived wastes (IDW) generated by the installation process are typically stored on site in properly labeled D.O.T. approved containers pending analytical characterization and are managed according to all local, state, and federal regulations. Manifests and disposal tracking documentation are generated for the transportation and disposal of IDW.

Waste Disposal

All soil cuttings and investigation derived wastes (IDW) generated during drilling activities will typically be placed in labeled, DOT-approved 55-gallon steel drums and stored on-Site pending analytical characterization. All waste will be properly disposed/recycled in accordance with all applicable Federal, State, and local regulations.

SOP #7 WELL DEVELOPMENT

The following section describes *Well Development* procedures to be utilized by SECOR personnel in the performance of the field sampling and testing tasks. All field activities are to be performed under the direction of a SECOR California Registered Professional Engineer or Geologist.

Upon installation of a groundwater monitoring well, the drilling contractor will develop the well (with the exceptions noted below). Development of the well will involve both surging and bailing. Prior to and between uses, SECOR personnel will assure that the drilling contractor is decontaminating any equipment entering the well. The drilling contractor will typically use a high-pressure washer during the decontamination process.

At regular intervals, the dissolved oxygen, redox potential, turbidity, temperature, pH, and specific conductivity of the purge water will be measured using a meter or meters. Stabilization parameters will be recorded on a SECOR Well Development Data Sheet.

SECOR personnel will continue to develop the well until one of the two following conditions are met:

- Three to five well-casing volumes of purge water are removed and dissolved oxygen, redox potential, turbidity, temperature, pH, and specific conductivity are stabilized, or
- Recharge of the well is not sufficient to sustain the purging process.

A well plug and lock will be installed on the well, and the well box lid will be secured. Purge and decontamination water will be contained in Department of Transportation

(DOT) approved 55-gallon drums. The drums will be temporarily stored on site pending disposal.

The list of field equipment and supplies for development is provided below.

- Meter(s) (capable of measuring dissolved oxygen, redox potential, turbidity, temperature, pH, and specific conductivity);
- Surge block (provided by drilling contractor);
- Purge bailer (provided by drilling contractor);
- 55-gallon drums (DOT approved); and
- Tools required to remove well box cover (typically a standard socket set). Also appropriate key to unlock well plugs.

ATTACHMENT F

Site Specific Health and Safety Plan

American Polystyrene Corporation Facility
1225 West 196th Street
Torrance, California
SECOR Project No. 37BP.XB010.03

Site-Specific
Health & Safety Plan for
Site Assessment Activities

American Polystyrene Corporation
1225 West 196th Street
Torrance, CA 90502

Prepared for:

Atlantic Richfield Company

Prepared by:

SECOR

290 Conejo Ridge Avenue, Suite 200
Thousand Oaks, California 91360

August 28, 2006

SECOR
HEALTH AND SAFETY PLAN
REVIEW AND APPROVAL

CLIENT: Atlantic Richfield Company

SITE NAME: American Polystyrene Corp

PROJECT NAME: American Polystyrene Corp

PROJECT NUMBER: *37BP.XB101.03*

START DATE: October 1, 2006

END DATE: April 1, 2007

PLAN REVIEW DATE: April 1, 2007
(Last day of expected fieldwork or no longer than 6 months).

Philip Kinney ***Project Manager***	Signature:	Date: 8-30-06
StephAnnie Roberts ***SECOR Office Health and Safety Coordinator***	Signature:	Date: 08.30.06
Randy Couture ***Site Health and Safety Officer***	Signature:	Date: 08/30/06
John Bollier ***Business Unit Leader***	Signature:	Date: 8/30/06
StephAnnie Roberts ***Peer Reviewer***	Signature:	Date: 08.30.06

This Health and Safety Plan has been written for the use of SECOR and its employees. It may also be used as a guidance document by properly trained and experienced SECOR subcontractors and clients.

Our work can be hazardous, and it is imperative that we never forget that! It is the intent of this document to address our risks. The health and safety guidelines in this Plan were prepared specifically for this site, its conditions, purposes, dates and personnel and must be amended if conditions change. This Plan must not be used on any other site without prior research by trained health and safety specialists.

SECOR claims no responsibility for its use by others for purposes unrelated to this project. This Plan will provide useful information to subcontractors and will assist them in developing their own HASP. Subcontractors should sign this plan (See **Attachment 7**) as an acknowledgement of hazard information and notice that they must ensure that the risks posed by work on this site are addressed. SECOR is readily available to assist subcontractors in identifying and addressing their employees' risks.

BPACC01720

TABLE OF CONTENTS

ATTACHMENTS

1.0 LOCAL EMERGENCY CONTACT NAMES, PHONE NUMBERS, AND DIRECTIONS TO THE HOSPITAL

The location of the nearest telephone is **facility phone or field staff cell phone**

	NAME	TELEPHONE NO.
Hospital	Memorial Hospital of Gardena 1145 W. Redondo Beach Blvd. Gardena, CA 90247	911 or 310-538-6629
Ambulance	McCormick Ambulance	911 or 310-219-0611
Police/Sheriff	Gardena Police	911 or 310-217-9601
Fire	Gardena Fire Dept (station 51)	911 or 310-217-7066
BP/ARCO Incident Response Center (to be contacted in case of an emergency)	Naperville Incident Response Center	(800) 321-8642

DIRECTIONS AND MAP TO THE HOSPITAL – SEE NEXT PAGE

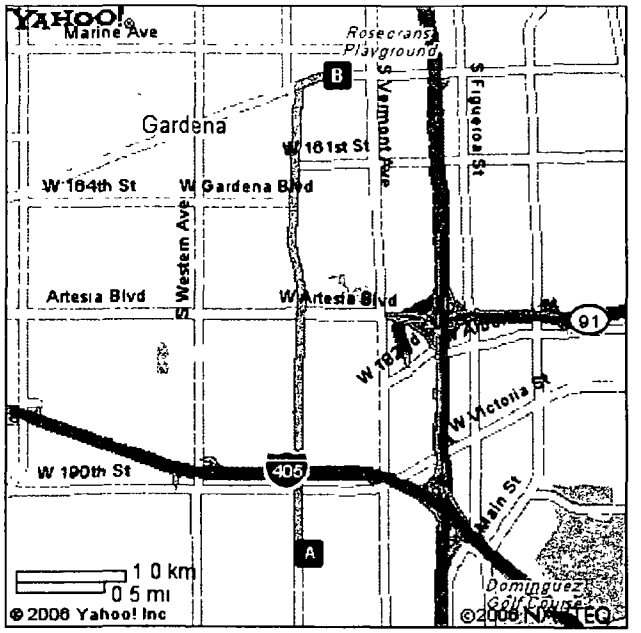
BPACC01723

START 1225 W 196th Street, Torrance, CA 90502-1102 US

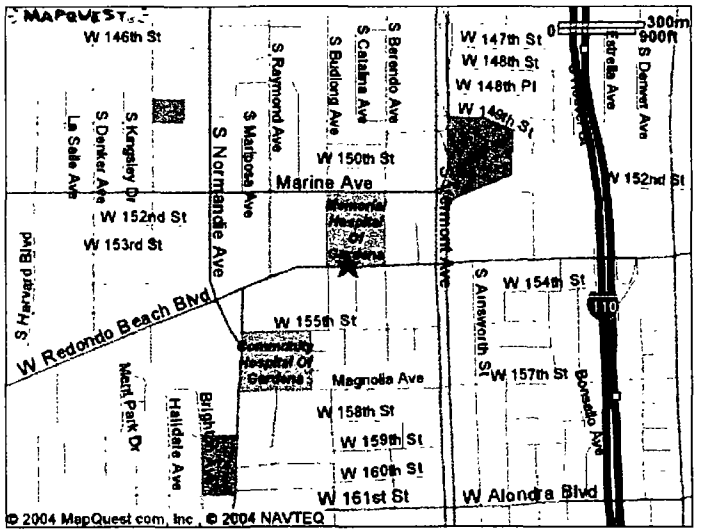
END 1145 W Redondo Beach Blvd, Gardena, CA 90247-3528 US

Maneuvers	Distance
1: Start at **1225 W 196TH ST, TORRANCE** - go **0.1** mi.	0 1 miles
2: Turn R on **NORMANDIE AVE** - go **2.5** mi	2.5 miles
3: Continue on **NORMANDIE WAY** - go **0.1** mi	0.1 miles
4: Turn R on **W REDONDO BEACH BLVD** - go **0.2** mi	0 2 miles
5: Arrive at **1145 W REDONDO BEACH BLVD, GARDENA,** on the L	

Total Est. Time: 6 minutes **Total Est. Distance:** 3 0 miles



Driving Directions



Close up of Hospital

BPACC01724

2.0 OBJECTIVES AND GOALS OF THIS HASP

Let's be clear about our objectives in this HASP. The purpose of this HASP is to:

- Document a proactive, scientific exposure assessment, which identifies and helps us understand our risks.
- Document proactive precautions we are going to take to avoid the risks.

Let's be clear about our goal in this HASP. Our goal is to:

- Complete our work on this site without incidents of all types; no injuries, no illnesses, no impacts to the environment or to property and equipment In order to achieve this goal, the project team must work together to perform an effective hazard assessment The team will then establish appropriate precautions and communicate these daily among project staff. Staff will be responsible for communicating changing field conditions to the project management so these conditions and appropriate precautions may be reevaluated as needed. We expect all subcontractors and project personnel to share this goal

3.0 SCOPE OF WORK

The purpose of this project is to

Complete assessment of the site including the following sub project phases:

- Geophysical Survey,
- Complete drilling and collection of samples as necessary for evaluation of the composition & properties of the soil by GeoProbe,
- Installation of additional monitoring well, on-Site, and
- Well development activities of newly installed well

This HASP was prepared for the use of SECOR personnel while performing the following tasks:

Task 1 Pre-drilling Site Inspection/Geophysical Survey

Task 2 Drilling and sample collection using Geoprobe.

Task 3 Installation of one additional groundwater monitoring well, on-Site.

Task 4 Well development activities of newly installed well

4.0 EMERGENCY RESPONSE

- *Remember this must be specific to the site and discussed with the client/facility manager*
- *This must be coordinated with other contractors working on the site. This can be done at the initial site meeting, but do not forget to do it*
- *In addition to injuries and illnesses noted here, this section should also address how the client wants us to respond to: the public or the press, fires, bomb threats, etc*
- *You must discuss emergency response at the pre-startup meeting with the contractor to make sure that you can act on the response plan in the event of an emergency.*
- *All SECOR staff on site must have completed CPR and First Aid training.*
- *In the event of an injury or illness, notification of the family of the individual involved shall be made as promptly as possible following the office's emergency action plan.*
- *You must have an eyewash bottle with you on site in case you get something in your eyes.*

The **Site Health & Safety Officer (SHSO)** must be familiar with the directions to the hospital given in **Section 1.**

Injury or Illness

If an injury or illness occurs, take the following action

- Determine if emergency response **(fire/ambulance)** staff are necessary. If so, dial **911 (fire: 310-217-7066 / ambulance: 310-219-0611)** on cell phone or closest available phone *(Indicate location of closest phone in the plan.)* Provide the location of the injured person and other details as requested If it makes sense to take an individual to the hospital, follow the directions in **Section 1.**

- Get First Aid for the person immediately Utilize first aid kit in vehicle. Also utilize the bloodborne pathogens kit.

- Notify the **SHSO** immediately The **SHSO** is responsible for preparing and submitting the Incident/Near Miss Investigation Report to Mary Harris in SECOR's Human Resources within 24 hours of the incident, as well as notifying the employee's supervisor and Business Unit Manger. Use the Incident/Near Miss Investigation Report and Root Cause Analysis Flowchart in **Attachment 3**. Ms. Harris' phone is (619) 718-9429 ***(Note: All incidents must be reported to Human Resources within 24 hours, but the actual investigation need not be completed within 24 hours.)***

- The **SHSO** will assume responsibility during a medical emergency until more qualified emergency response personnel arrive at the site

First Aid Procedures for Minor Cuts, Scratches, Bruises, etc.

- Each occupational illness or injury shall be reported immediately by employees to the **SHSO** The **SHSO** will complete the Incident/Near Miss Investigation Report in **Attachment 3** and report the incident to Human Resources.

Medical Cases Not Requiring Ambulance Service

- Medical cases normally not requiring ambulance services are injuries such as minor lacerations, minor sprains, etc
- The **SHSO** will ensure prompt transportation of the injured person to a physician or hospital following the directions in **Section 1**
- A representative of SECOR/sub-contractor should always drive the injured employee to the medical facility and remain at the facility until the employee is ready to return.
- If the driver of the vehicle is not familiar with directions to the hospital, a second person shall accompany the driver and the injured employee to the hospital
- If it is necessary for the **SHSO** to accompany the injured employee, provisions must be made to have another employee, properly trained and certified in first aid, to act as the temporary **SHSO**
- If the injured employee is able to return to the jobsite the same day, he/she should bring with him/her a statement from the doctor containing such information as.

    - Date
    - Employee's name
    - Diagnosis
    - Date he/she is able to return to work, regular or light duty
    - Date he/she is to return to doctor for follow-up appointment, if necessary
    - Signature and address of doctor

    If the injured employee is unable to return to the jobsite the same day, the employee who transported him should bring this information back to the jobsite and report it to Mary Harris in Human Resources at (619) 718-9429 and the Director of Industrial Hygiene and Health & Safety, Philip Platcow at (617) 232-7355

Emergency Cases Requiring Ambulance Services

- Medical cases requiring ambulance services would be such cases as severe head injuries, amputations, heart attacks, etc.
- Should ambulance service be necessary, the following procedures should be taken immediately.

    - Contact necessary **ambulance** service and company emergency services by dialing **911 (ambulance: 310-219-0611)** and notify the **SHSO** for the site.

- Administer first aid until ambulance service arrives

- While the injured employee is being transported, the **SHSO** should contact the medical facility to be utilized

- One designated representative should accompany the injured employee to the medical facility and remain at the facility until final diagnosis and other relevant information is obtained.

Death of an Individual or Hospitalization of Three or More Employees

The procedure as outlined in "First Aid and Medical Cases", above, should be followed. If the injured person dies, then SECOR Human Resources Department, local officials and coroner must be notified ***immediately*** SECOR Human Resources will notify the **local OSHA office within 8 hours of the incident or fatality** in the event of fatality or hospitalization of three or more employees

Response to Spills or Cut Lines

Prevent problems by documenting the location of underground lines (e.g , product, sewer, telephone, fiber optic) before starting site work If a line or tank is drilled through, or another leak occurs, document the event as soon as possible using the Incident Investigation Report in **Attachment 3. Notification of the event must be made to SECOR Human Resources within 24 hours.** Include dates, times, actions taken, agreements reached, and names of people involved. Use additional pieces of paper to document the event completely. The **SHSO**, PM and client must be notified immediately. The PM will notify the regulatory authority or utility as necessary

In the event of a spill/release, follow this plan

1 Stay upwind of the spill/release
2. Wear appropriate PPE
3. Turn off equipment and other sources of ignition.
4. Turn off pumps and shut valves to stop the flow/leak·
5. Plug the leak or collect drippings, when possible
6. Use sorbent pads to collect product and impede its flow, if possible.
7. Call Fire Department immediately if fire or emergency develops.
8 Inform SECOR Project Manager about the situation
9. Determine if the client wants SECOR to repair the damage or if the client will use an emergency repair contractor.
10 Based on agreements, contact emergency spill contractor for containment of free product The contact for this project will be **ARCO Maintenance** at **(800) 272-6349.**
11 Advise the client of spill discharge notification requirements and determine who will complete and submit forms *(Do not submit or report to agencies without the client's consent)* Document each interaction with the client and regulators and note, in writing; name, title, authorizations, refusals, decisions, and commitments to any action.
12 Do not transport or approve transportation of contaminated soils or product until proper manifests have been completed and approved. Be aware that soils / product may meet criteria for hazardous waste

13 Do not sign manifests as generator of wastes; contact PM or Waste Compliance Manager to discuss waste transportation.

Notifications – a spill/release requires completion of an Incident Investigation (II) as per SECOR's ALLY program. **The PM must involve the client/generator in the Incident Investigation process. SECOR's incident investigation form must be completed (see Attachment 3) and submitted to Human Resources with 24 hours. The client/generator is under obligation to report to the proper government agencies. If the spill extends into waterways, the Coast Guard and the National Response Center (800) 424-8802 must be notified immediately by the client or with his permission.**

All spills/releases must be reported to **Kyle Christie** at **714-670-5303** (Client) within 24 hours

5.0 CONTRACTOR EMERGENCY ACTION PLAN

The **SHSO** will ensure that the Subcontractor/Contractor is capable of efficient evacuation/emergency response in the event of an emergency Subcontractor/Contractor's employees will be trained by their employer in site-specific evacuation/emergency procedures, including alarm systems and evacuation plans and routes.

The Subcontractor/Contractor shall instruct its employees that in the event of an emergency such as a **fire**, release, or accident involving injuries, they are required to dial **911 (fire: 310-217-7066)** The reporting employee is to state the problem clearly and fully and remain on the line until dismissed by the operator

SECOR staff and Subcontractor/Contractors working in an area where an emergency exists shall evacuate to a safe location, preferably upwind, away from the area and take attendance **The gathering location will be determined by the SECOR SHSO upon arrival on site It is the responsibility of the SHSO to annotate the Site Plan with the gathering location position and to disseminate that info to all site personnel during the Daily Production Safety Meeting and any other appropriate time after that.**

(If the emergency causes the route to a gate surrounding the site to be closed, the SECOR staff and Subcontractor/Contractors shall move to an open area upwind of the hazard area, and remain there until instructed by emergency response personnel (i.e., police, fire, ambulance, paramedics, etc.) to do otherwise)

Subcontractor/Contractor has the responsibility to account for its own employees and to provide such information immediately to emergency response personnel upon request

SECOR staff and Subcontractor/Contractor may not reenter the emergency site without specific approval from emergency response personnel

In the event of fire ignition in close proximity to SECOR staff and Subcontractor/Contractor's employees, those persons shall evacuate the area and notify emergency personnel unless the fire is readily extinguished with portable dry chemical equipment on-hand. **When in doubt, emergency response personnel shall be notified**

6.0 BACKGROUND INFORMATION ON THE PROJECT SITE

The Site is located east of the intersection of Normandie Avenue and West 196th Street in the City of Torrance at an elevation of approximately 44 feet above mean sea level (amsl). The current APC plant is located on two parcels of approximately 2.1 total acres and consists of offices, a small laboratory, an 18,000 square foot warehouse, up to 30 aboveground storage tanks (ASTs) and silos for the storage of liquids and solid, a batch plant processing area, a railroad spur, aboveground water recycling and cooling tower equipment, and maintenance and storage buildings There is no history of underground storage tanks (USTs) at the Site and all piping appears to be aboveground except for the sanitary sewer line A septic tank may have operated on Site prior to 1969.

The production of polystyrene resin from styrene monomer has been the primary activity at the Site since development of the property. Aerial photographs indicate the Site was use for agriculture or was vacant up to at least 1956 (air photo, 1956). The original polystyrene plant was built on the western parcel by Brand Plastics Company in 1962. Amoco Chemical Company (Amoco) acquired the property in 1964 and operated the facility until May 1993, when APC purchase the property and the plant. BP acquired Amoco [redacted] and subsidiary companies in 199xxx.. and has never been actively involved in facility operations. Atlantic Richfield Company is also a subsidiary of BP.

The APC Facility is located in an area with a history of heavy industrial land use since 1940's The Del Amo superfund site is located directly east and adjacent to the Site This large facility of originally over 280 acres was built to provide synthetic rubber during World War II and was dismantled in the 1970's Approximately a third of the Del Amo facility produced polystyrene well before the Brand/Amoco/APC site began production starting in the 1960's PRP for the Del Amo remediation is Shell Oil Company under the oversight of the USEPA

A former McDonnell Douglas manufacturing plant was located west of the Site The plant operated from approximately 194xx to 1988xx

Currently, liquid styrene monomer is brought to the plant in railroad tank cars and transferred to one of two 30,000 gallon ASTs in the eastern secondary containment area Styrene monomer is produced by xxx of ethylbenzene. Prior to 1972 the styrene monomer was brought in by a pipeline from the former Del Amo facility to the east, which was operated at the time by Shell Oil Company. The former location of this pipeline on the property is not known.

The styrene monomer is mixed with small amounts of other raw materials in batch tanks located in the northern secondary containment area Additives include mineral oil, zinc stearate, acrawax, and anti-oxidants The batch is then sent to one of two production lines for the polymerization heating and reaction process. Any overfill or condensate is collected and circulated back to a tank for late reuse

The polystyrene production process includes the use of cooling water to maintain process temperatures and cool polymer that emerges at the end of the process in a water bath Documents indicate that from 1962 to 1969 the spent process water flowed through two "interceptors" or clarifiers, then to a 12,000 gallon "unlined sump" for evaporation, and finally excess water exceeding the sumps capacity was disposed of in a 35 foot a "dry well" The interceptors, sump, and dry well were apparently located on the property, but no documents or physical evidence have been found to indicate their locations (EEI, 1986)

In about 1969, the cooling water process was diverted to the sanitary sewer and the dry well was reportedly "filled and blacktopped". In 1973, the County Sanitation District refused further discharge of the "clean water" to the sewer (EEI, 1986). Alternatives for the disposal of excess cooling water included installing a new dry well or injection well or installing a recirculation and cooling tower system. APC selected and installed the closed-loop recirculation system and a second well was not installed.

7.0 CLIENT SAFETY PROCEDURES

BP Passport – Held by each individual
C A R E Card – See **Attachment 1**
Safety Reinforcement Plan - See **Attachment 1**
Authorization to Work (ATW) – See **Attachment 1**
Permit to Work (PTW) – as necessary

8.0 SITE PLAN

Site Plans are included in **Attachment 2.**

9.0 GOVERNMENT AND LINE LOCATOR CONTACT NAMES AND PHONE NUMBERS

AGENCY or LINE LOCATOR	NAME	TELEPHONE NO.
Office of Emergency Services		(800) 852-7550
National Response Center		(800) 424-8802
U.S. EPA (24 Hour Hotline)		(800) 424-9346
County Regulatory Agency Utility Locator	USA Dig Alert	(800) 422-4133
Private Utility Locator	Spectrum Geophysics	(818) 565-3590

BPACC01731

10.0 PROJECT PERSONNEL AND RELEVANT INFORMATION

Questions about this project posed by neighbors, the press, or other interested parties should be directed to:

Phil Kinney Company SECOR International Inc. Phone: 805-230-1266 ext. 224

Site personnel shall be trained and certified in hazardous waste operations, and shall have had a physical examination consistent with 29 Code of Federal Regulations (CFR) 1910 120 (and 8 California Code of Regulations (CCR) 5192, if applicable)
Subcontractors shall review and sign the form in **Attachment 7 ACKNOWLEDGMENT & AGREEMENT FORM**

PROJECT JOB TITLE	NAME	TELEPHONE NO.	GENERAL PROJECT RESPONSIBILITIES	TRAINING DATES			MEDICAL SURVEIL-LANCE DATE
				40 Hr HAZWOPER	8 Hr Refreshe r	CPR/Firs t Aid	
Site Health and Safety Officer	Randy Couture	805-427-4863 cell	Implementing this HASP Has authority to stop work Perform air quality tasks Take charge of all incidents Review subcontractor's HASP	05/00	08/06	06/05	11/05
Project Manager	Phil Kinney	805-427-4856 cell	Overall financial and logistics Contact client and subs to understand all hazards Discuss with SHSO Follow-up all incidents upon notice	09/90	02/06	06/03	03/06
Project Staff	StephAnnie Roberts Gareth Roberts Mark Mason	805-427-4873 cell 805-427-4853 cell 805-341-1492 cell	Conduct work in accordance with JSA and this HASP Report all incidents and near misses immediately to Project Manager	11/98 05/96 09/01	08/06 08/06 08/06	06/05 06/05 05/06	04/06 04/06 09/06
Subcontractor-Project Manager			Oversee work of own staff Ensures that their own HASP is site-specific				
Subcontractor-			Conduct all drilling/soil borings & monitoring well installs Exact drillers to be on site are not known at this time	NA	NA	NA	NA
SECOR Business Unit Leader	John Bollier	805-230-1266 x 241 805-427-4852 cell	Provide immediate support at notice of all incidents	12/87	02/06	06/05	12/06
Client Contact	Kyle Christie	714-670-5303 714-815-8971 cell	Provide all known analytical data performed by others and notice of hazards Provide access to site and available emergency response capabilities	NA	NA	NA	NA
SECOR Director of Industrial Hygiene	Philip Platcow, CIH	(617) 232-7355 Office (617) 899-5403 Cell (617) 739-1224 Home	Respond with corporate resources to all incidents as appropriate Assist in HASP review Assist in incident investigation	01/13/95	01/21/05	01/20/05	02/17/05
SECOR Human Resources Director	Marguerite Shuffelton	(619) 718-9430 (619) 925-8365 Cell (760) 749-9603 Home	Assist with incident review, recordkeeping	N/A	N/A	N/A	N/A

11.0 MAXIMUM CONCENTRATIONS OF CONTAMINANTS IDENTIFIED ONSITE/

Listed below are the maximum concentrations of contaminants in the soil/groundwater that are expected to be encountered at the site

Substance	Date of Sample	Media	Sample Concentration
GRO	01/26/04	Water	[redacted] µg/L
Benzene	01/26/04	Water	[redacted] 94 µg/L
Toluene	01/26/04	Water	[redacted] 1.1 µg/L
Ethylbenzene	01/26/04	Water	[redacted] 9.7 µg/L
Total Xylenes	01/26/04	Water	[redacted] 3.3 µg/L
PCE	1991	Water	11,000 µg/L
TCE	1991	Water	27,000 µg/L

BPACC01733

12.0 POTENTIAL AIRBORNE CONCERNS

POTENTIAL AIRBORNE CHEMICALS ONSITE IN THIS PROJECT REVIEW THIS TABLE AND CONTACT SHSO WITH QUESTIONS						
CHEMICAL (OR CLASS)	**OSHA PEL ACGIH TLV**	**OTHER PERTINENT LIMITS**	**WARNING PROPERTIES**	**ROUTES OF EXPOSURE OR IRRITATION**	**ACUTE HEALTH EFFECTS**	**CHRONIC HEALTH EFFECTS/ TARGET ORGANS**
Benzene (1910 1028)	Cal/FedOSHA PEL 1 0 ppm TLV 0 5 0 ppm (skin)	CalOSHA & FedOSHA STEL 5 0 ppm NIOSH REL 0 1 ppm IDLH 500 ppm	Characteristic benzene odor	Inhalation, Dermal, ingestion, eyes	Skin (dermatitis), eye, respiratory tract irritant, headache, dizziness, nausea	Carcinogen, CNS, eye damage, bone marrow, blood, skin, leukemia
Toluene	CalOSHA PEL 50 ppm FedOSHA PEL 200 ppm TLV 50 ppm	NIOSH REL 100 ppm TWA, 150 ppm STEL ILDH 500 ppm CalOSHA C 500 ppm CalOSHA STEL 150 ppm	Sweet, pungent, benzene-like odor	Inhalation, dermal, ingestion, eyes	Skin (dermatitis) eye, respiratory tract irritant, headache, dizziness, weakness, and fatigue	CNS, liver, kidneys, skin
Ethylbenzene	Cal/FedOSHA PEL 100 ppm TLV 100 ppm	PEL-STEL 125 ppm TLV STEL 125 ppm NIOSH REL 100 ppm, REL-STEL 125 ppm IDLH 800 ppm CalOSHA STEL 125 ppm	*Pungent aromatic odor*	Inhalation, dermal, ingestion, eyes	Skin/eye/mucous membrane irritant, headache, dizziness, drowsiness	Eyes, respiratory tract, skin, CNS, blood, kidneys, liver
Xylenes	Cal/FedOSHA PEL 100 ppm TLV 100 ppm	TLV STEL 500 ppm NIOSH REL 100 ppm REL STEL 100 ppm IDLH 900 ppm CalOSHA C 300 ppm CalOSHA STEL 150 ppm	*Aromatic odor*	*Inhalation*, dermal, ingestion, eyes	*Throat and skin irritant* (dermatitis), headache, nausea, drowsiness, fatigue	CNS, liver, kidneys, skin, gastrointestinal damage, eye damage
Carbon Tetrachloride	CalOSHA PEL 2 0 ppm FedOSHA 10 ppm TLV 5 ppm	CalOSHA STEL 10 ppm NIOSH STEL 2 ppm FedOSHA C 25 ppm	Colorless liquid with a characteristic ether like odor	Inhalation, absorption through the skin or eye, ingestion	Headache, tachypnea, nausea, dizziness, confusion, hallucinations, cyanosis	CNS, eyes, lungs, liver, kidneys, skin

Chlorobenzene	CalOSHA PEL 10 ppm FedOSHA PEL 75 ppm TLV 10 ppm	IDLH 1000 ppm,	Colorless liquid with an almond like odor	Inhalation, ingestion, dermal, eyes	Irritated eyes, skin, nose, drowsiness, increased CNS depression in animals	Liver, lung, kidney injury Skin, eyes, respiratory system, CNS, liver
Chloroform	CalOSHA PEL 2 0 ppm TLV 10 ppm	FedOSHA C 50 ppm NIOSH STEL 2 0 ppm IDLH 500 ppm	Colorless liquid with pleasant, sweet odor	Inhalation, dermal, ingestion	Dizziness, mental dullness, nausea, disorientation, headaches, eye and skin irritation	Liver, kidney, heart, eyes, skin and potential human carcinogen
Chromium	CALOSHA PEL 0 5mg/m3 PEL 1mg/m3 TLV 0 5mg/m3	NIOSH REL 0 5mg/m3 IDLH 250 mg/m3	Blue-white to steel gray, lustrous, brittle, hard, odorless solid	Inhalation, ingestion, dermal, eyes	Irritated eyes, skin and lungs	Eyes, skin and respiratory system
Copper	Cal/FedOSHA PEL 1 mg/m^3 TLV 1 mg/m^3	NIOSH REL 1 mg/m^3	Reddish, lustrous, malleable, odorless solid	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, pharynx, nasal perforation, metallic taste, dermatitis	In animals, lung, liver, and kidney damage, anemia, carcinogen Skin, lung, kidney, and bladder cancer
1,2 Dichlorobenzene	NIOSH/FedOSHA PEL 50 ppm TLV 1 0 ppm	IDLH 200 ppm	Colorless to pale yellow liquid with a pleasant aromatic , herbicide-like odor	Inhalation, dermal, ingestion, and eye contact	Eye and nose irritant, skin blisters	Eyes, skin, liver, kidney, lungs, CNS
1,4 Dichlorobenzene	Fed OSHA PEL 75 ppm TLV 10 ppm	FedOSHA Potential occupational carcinogen at150 ppm	Colorless to white crystals with a strong odor	Inhalation, ingestion	Eye, skin, respiratory irritant, Blood and CNS system may lead to impaired functions	Liver, kidneys, blood, potential carcinogen
1,1-Dichloroethane	Cal/Fed OSHA PEL 100 ppm TLV 100 ppm	NIOSH REL 100 ppm IDLH 1000 ppm	Colorless oily liquid with a chloroform-like odor	Inhalation, ingestion, absorption skin	Irritated skin, CNS depression	Skin, liver, lung, kidney, lungs, CNS depression

1,2-Dichloroethane (Ethylene Dichloride, DCE)	FedOSHA PEL 50ppm Cal OSHA PEL 1 ppm TLV 10ppm (TLV for 1,1-dichloroehtane is 100ppm)	NIOSH recommends that this compound be treated as a carcinogen and exposure limited as much as possible	Clear, colorless, oily liquid Can darken with age Can have a pleasant odor	Inhalation, absorption skin or eyes, ingestion	Irritation to eyes, skin, respiratory tract, mucous membranes Headache, nausea, vomiting, Irritability, CNS depression	Eyes, liver, kidney, skin, CNS
1,1-Dichloroethene (Vinylidene Chloride) (1,1 DCE)	CalOSHA PEL 1 0 ppm FedOSHA PEL None established TLV – 5 0 ppm	NIOSH considers this compound a carcinogen	Colorless liquid or gas (above 89°F) with a mild, sweet, chloroform-like odor	Inhalation, skin absorption, ingestion, and/or eye contact	Irritation to eyes, skin, *throat, dizziness,* headache, nausea, dyspnea (breathing difficulty)	Liver, kidney dysfunction, pneumonitis, Potential occupational liver and kidney carcinogen **Target Organs** Eyes, skin, respiratory system, central nervous system, liver, kidneys
1,2-Dichloroethene (Dichloroethylene)	Cal/FedOSHA PEL 200 ppm TLV - TWA 200 ppm	IDLH 1000 ppm	Solvent odor	Inhalation, skin absorption, ingestion, and/or eye contact	Typical solvent symptoms	Likely liver, kidney, and CNS symptoms
Cis-1,2-Dichloroethene Cis-1,2-DCE	PEL – None established TLV None established	REL None established	Colorless liquid	Inhalation, absorption skin or eyes, ingestion.	Irritation to eyes, skin, respiratory tract, mucous membranes Liver damage Narcotic	Eyes, respiratory tract, skin,
Trans-1,2-Dichloroethene Trans-1,2-DCE	Cal/FedOSHA PEL 200 ppm TLV 200 ppm	REL None established	Colorless liquid with fruity, pleasant odor	Inhalation, absorption skin or eyes, ingestion	Irritation to eyes, skin, respiratory tract, mucous membranes Irritability, CNS depression	Eyes, respiratory tract, skin, CNS
Freon 11 (*Fluorotrichloromethane*)	Cal/FED OSHA PEL 1000 ppm TLV None established	IDLH 2000 ppm NIOSH Ceiling 1000 ppm TLV Ceiling 1000 ppm	Colorless to water-white, nearly odorless liquid or gas (*above* 75° F)	Inhalation, ingestion, absorption skin or eye	In-coordination, tremors, dermatitis, cardiac arrhythmia, cardiac arrest, frostbite liquid	Skin, respiratory system, CVS

Freon 113 (1, 1, 2 –Trichloro-1, 2, 2 – Trifluoroethane)	Cal/FedOSHA PEL 1000 ppm TLV = 1000 ppm	CalOSHA C 2000 ppm Cal/FedOSHA STEL 1250 ppm	Colorless, nearly odorless, volatile liquid	Inhalation, dermal, ingestion	Throat irritation, drowsiness, dermatitis, narcosis	Skin and heart
Lead (1910 1025)	Cal/FedOSHA PEL 0 05 mg/m^3 TLV 0 05 mg/m^3	NIOSH REL 0 1 mg/m^3 IDLH 100 mg/m^3	A heavy, flexible, soft, gray solid	Inhalation, dermal, ingestion, eyes	Weakness, lassitude (weakness, exhaustion), abdominal pain, gingival lead line, tremor, irritation eyes, hypertension	Insomnia, facial pallor, anorexia, weight loss, *malnutrition*, constipation, colic, anemia, paralysis wrist, ankles, encephalopathy, kidney disease, Potential for damage to eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue
Mercury	CalOSHA PEL 0 01 mg/m^3 FedOSHA Ceiling Limit 0 1 mg/m^3 TLV 0 01 - 0 1 mg/m^3 depending on the form	NIOSH REL 0 05 mg/m^3 (skin) CalOSHA C 0 04 mg/m^3 CalOSHA STEL 0 03 mg/m^3 IDLH 10 mg/m^3	Silver-white, heavy, odorless liquid	Inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation to eyes, skin, cough, chest pain, dyspnea (breathing difficulty), *headache*, fatigue, weakness,	Bronchitis pneumonitis, tremor, *insomnia*, irritability, indecision, stomatitis, salivation, *gastrointestinal disturbance*, anorexia, weight loss, proteinuria **Target Organs** Eyes, skin, respiratory system, central nervous system, kidneys
Styrene	CalOSHA PEL 50 ppm FedOSHA PEL 100 ppm TLV 20 ppm	FedOSHA C 200 ppm CalOSHA C 500 ppm CalOSHA STEL 100 ppm TLV STEL 40 ppm NIOSH REL 50 ppm NIOSH STEL 100 ppm	Colorless to yellow, oily liquid with a sweet, floral odor	Inhalation, dermal, ingestion, eyes	Irritation to eyes, nose, *respiratory system*, headache, fatigue, dizziness, confusion, *malaise (vague feeling* of discomfort), drowsiness, weakness, unsteady gait, narcosis.	Defatting dermatitis, possible liver injury, reproductive effects
Tetrachloroethene (Perchloroethylene) (PCE)	CalOSHA PEL 25 ppm FedOSHA PEL 100 ppm TLV 25 ppm	FedOSHA Ceiling 200 ppm TLV STEL 100 ppm IDLH 150 ppm CalOSHA C 300 ppm CalOSHA STEL 100 ppm NIOSH considers this compound a carcinogen	Colorless liquid with a mild, chloroform-like odor	Inhalation, skin absorption, *ingestion*, and/or eye contact	Irritation to eyes, skin, *nose*, throat, respiratory system, nausea, flush face, neck, vertigo (an illusion of movement), dizziness, in coordination, headache, skin erythema (skin redness)	Somnolence (sleepiness, unnatural drowsiness), liver damage, Potential occupational liver carcinogen **Target Organs** Eyes, skin, respiratory system, liver, kidneys, central nervous system

Trichloroethene (Trichloroethylene) (TCE)	CalOSHA PEL 25 ppm Fed OSHAPEL 100 ppm TLV 50 ppm	Fed OSHA Ceiling 200 ppm CalOSHA STEL 100 ppm NIOSH considers trichloroethylene a *carcinogen*	Colorless liquid (unless dyed blue) with a chloroform-like odor	Inhalation, dermal, ingestion, eyes	Irritation to eyes, skin, headache, vertigo (an illusion of movement), visual disturbance, fatigue, giddiness, tremor, somnolence (sleepiness, unnatural drowsiness), nausea, vomiting, dermatitis,	Cardiac arrhythmias, paresthesia, liver injury, Potential occupational carcinogen of liver and kidney

Explanation of Abbreviations

PEL = Permissible Exposure Limit;
REL = Recommended exposure limit set by NIOSH,
C = Ceiling limit,
STEL = Short Term Exposure Limit;
DLH = Immediately Dangerous to Life or Health,
TLV = Threshold Limit Value set by the ACGIH (American Conference of Governmental Industrial Hygienists),
AIHA WEEL = Workplace Environmental Exposure Limits set by the AIHA (American Industrial Hygiene Association);
SKIN = Skin absorption,
NIOSH = National Institute for Occupation Safety and Health;
CNS = Central Nervous System,
CVS = Cardiovascular system

Action Level Table for Air Quality Monitoring
(Monitoring Equipment needed is unknown at this time)

- *The level for respirator use indicated below is that concentration at which a respirator must be put on It does not require the job to stop The respirator is a tool to be used while determining why the exposure has reached that concentration Take action to reduce the concentration by engineering controls such as water mist, spray foam, plastic cover, etc*
- *The level for work stoppage indicated below is that concentration at which work on the job must stop. Determine why exposures have reached that concentration and how they can be reduced Site evacuation is not necessary at this level It does not mean that stopping operations should reduce the likelihood that the concentration will continue to rise Implement engineering controls to reduce the concentration, then resume work*
- ***These values can be modified with particular knowledge of contaminants and site conditions. Contact Director of Industrial Hygiene & Health and Safety, Philip Platcow to discuss (617) 232-7355.***
- ***On Sites impacted with chemicals other Petroleum products, contact Phil Platcow, Director of IH/H & s, at (617) 232-7355 office/(617)899-5403 cell or Pat Wilson, CIH, at (817) 640-9621X34 office/(817) 296-3165 cell, for guidance on the air monitoring requirements***

CHEMICAL (OR CLASS)	MONITORING EQUIPMENT	TASK	MONITORING FREQUENCY/ LOCATION	LEVEL FOR RESPIRATOR USE	LEVEL FOR WORK STOPPAGE
Volatile Organic Vapors	FID/PID as appropriate for chemicals of concern Read manual to determine Draeger Tube for vinyl chloride (model 1/a part number 67 28031) Draeger Tube for benzene (model 0 5/a)	From start of mobilization to completion and demobilization	Sampling should be continuous during the project while disturbing potentially contaminated soil or uncovering/removing tanks and piping, or during drilling At least every 15 minutes in the breathing zone Sample at the exclusion zone boundaries every 30 minutes Continuously sample during each soil and groundwater sampling interval If 5 ppm in breathing zone, collect a Draeger tube for benzene and/or vinyl chloride (depending upon contaminants of concern)	Respirator to be used will be full-face piece respirator with organic vapor/P 100 combination cartridges. 20 ppm sustained in breathing zone for 2 minutes, and no benzene and/or vinyl chloride tube discoloration If a color change appears on tube for benzene or vinyl chloride at < 20ppm on PID/FID, don respirator If no Draeger Tubes are available, the level for respirator use will be 5ppm on the PID/FID At donning respirator level, determine cause of exposure and implement engineering controls to reduce concentrations.	50 ppm in breathing zone and no vinyl chloride or benzene tube discoloration Stop work if tube indicates > 1ppm for benzene or vinyl chloride If no Draeger Tube available, stop work at 25 ppm on the PID/FID Continuously attempt to determine cause of exposure and usage of engineering controls to attempt to never reach the stop work level
Oxygen/LEL	Combustible Gas Meter	Disruption of soil Disconnecting and removal of piping Removal of the tank Removal of contaminated soil	From start of disruption of potentially contaminated soil through removal of any contaminated soil	< 19 5% use supplied air	> 10% LEL

BPACC01739

CHEMICAL (OR CLASS)	MONITORING EQUIPMENT	TASK	MONITORING FREQUENCY/ LOCATION	LEVEL FOR RESPIRATOR USE	LEVEL FOR WORK STOPPAGE
Oxygen/LEL/ H_2S/CO	Four gas meter	Disruption of soil , (including drilling) Removal of contaminated soil	From start of disruption of potentially contaminated soil through removal of any contaminated soil Drillers must have personal H_2S monitors on at all times once the ground is broken while in the vicinity of the borehole The SHSO will provide O/LEL/ H_2S/CO monitoring at least every 15 minutes in the breathing zone and at the exclusion zone boundaries every 30 minutes	< 19 5% Oxygen use supplied air	> 23 5% Oxygen < 19 5% Oxygen without the use of supplied air respirators > 10% LEL > 10 ppm H_2S > 25% CO

13.0 DETAILED PROJECT STEPS WITH HAZARD ASSESSMENTS AND PRECAUTIONS

Traffic Guidance and Control Plan:

Incidents on sites have shown the need for a well-thought out traffic guidance and control plan This plan must consider

- **On-site well delineation will utilize safety delineators, orange fencing *(Mod to High Hazard Level)* and yellow caution tape *(None to Low Hazard Level)*. An appropriate exclusion zone with at least a ten foot barrier from all dispenser islands, and four-feet tall will be used to designate a safe working area for all equipment and personnel working on site.**

- **Off-site well delineation will be provided by a licensed professional traffic control service. Location specific plans will be provided for each well.**

- **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a "formally developed" Traffic Guidance and Control Plan is not available. It is also the responsibility of the SHSO to disseminate the Traffic Guidance and Control information to all site personnel during the Daily Production Safety Meeting and any other time as necessary.**

Work on this project will be conducted during the hours **0600 – 1800, Monday - Friday**

Shutoff valves/switches for utilities and products **It is the responsibility of the SHSO to annotate the Site Plan with the location of all shutoff valves and switches and to disseminate that information to all site personnel during the Daily Production Safety Meeting and any other time as necessary**

Personal Safety Concerns and Precautions **There are no other safety concerns associated with this site other than those normally encountered on a hazardous waste site.**

Jewelry safety **Jewelry can be dangerous. Large ear rings, long necklaces, loose-fitting bracelets, rings, watches, etc. can become entangled in machinery and cause removal of limbs, as well as be conductive of electricity. Use caution and avoid unnecessary hazards!**

Task: 1 through 4 Pre-drilling site Inspections, site access set-up, staging area, and equipment access planning to the site.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday. Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
General			
Keep SPSA card on you at all times Use it frequently *What can happen? What is the worst thing that can happen? Plan for it and carry out your plan.*			
Typical Site Assessment work, determination of site access routes, staging Area Minor grading if necessary	Steel toed and shank shoes, hardhat, safety glasses with side shields, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary If you suspect that chemical exposure is possible, wear chemical resistant gloves, aprons, etc. Use disposable shoe covers similar (boots worn over steel toe boots) to prevent contact of the tar-like material with shoes	Weather related incidents slips, trips and falls due to wet weather, unstable slopes after prolonged wet weather periods ankle sprains, other muscle strains due to uneven and inconsistent terrain.	• Check weather reports daily Project visits will not be performed during inclement weather. Sampling may be performed during light rain mist Wear raincoats Hot weather may change the surface conditions, making the surface susceptible to sinking • Watch for surface slipping hazards due to wet, muddy surfaces • Do not drive vehicles to the site until access paths are in place and the safe driving surfaces and paths are established Watch for steep gradients and unsafe slopes. Always use a spotter to ensure the vehicles remains on drivable surfaces
Typical work		Cold Stress	• For temperatures below 40^{0}F, adequate insulating clothing must be worn If the temperature is below 20 ^{0}F, workers will be allowed to enter a heated shelter at regular intervals. Warm, sweet drinks should be available Coffee intake should be limited • No one should begin work or return to work from a heated shelter with wet clothes. Workers should be aware of signs of cold stress, such as heavy shivering, pain in fingers or toes, drowsiness or irritability. Onset of any of these signs are indications for immediate return to a heated shelter • Refer to ACGIH TLV Booklet for section on Cold Stress
Typical work		Heat Stress	• Discuss health effects and symptoms during daily production meetings. • Drink water regularly, i e , at least one cup every 20-30 minutes depending upon level of effort and PPE worn • Refer to ACGIH TLV booklet for heat stress guidance, especially regarding PPE, type of work and frequency of breaks • Breaks should be taken in an area cooler than the work area.
No eating, drinking, or smoking on-site No contact lenses on-site No facial hair that would interfere with respirator		Ingestion of contaminants	• Use proper personal hygiene practices. • Use proper decontamination practices. • Exit Exclusion Zone and wash hands face & neck before eating, drinking or smoking • Utilize appropriate spectacle kit with the respirator in use

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered			
❶ **Job Steps**	❷ **Personal Protective Equipment**	❸ **Potential Hazard**	❹ **Critical Actions**
fit A safety meeting shall be held each day, even if there is only one person working on the project on any given day.			• Shave each morning before using respirator Ensure that no facial hair interferes with respirator seal area. • Topics will always include the work scheduled for the day and restatement of the hazards and means to avoid them. Other topics may extricated from the list included in the HASP. • Use **Attachment 6** for logging the topics discussed

Task. 1 Surveying

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe All employees should act proactively to identify and mitigate hazards to the safest extent of their ability

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Mobilize with the proper equipment for surveying	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves	Vehicle accident Lifting hazards Delay or improper performance of work due to improper equipment onsite Automotive equipment failure, unfamiliar company vehicle, or unsafe weather conditions	• Start project with Production Safety Meeting Review Site Specific Safety and Health Plan (SSSHP) especially chemical and site hazards, JSAs and work activities, and emergency ingress/egress, safe refuge, emergency signals and hospital/emergency care specific to the site Advise other contractors on site, if any, of planned work activity, and determine their operations Identify and locate the safety equipment specified for the activity - SECOR • Follow safe driving procedures Practice defensive driving methods - adhere to posted speed limits and travel slower than speed limits if necessary Keep a safe distance from the vehicle in front of you to allow for stopping distance Avoid cellular phone use except when parked in a safe location Perform a check of vehicle/trailer prior to driving, check security of load, take ample time to orient self with unfamiliar vehicle, take more time to get to site if weather conditions are unsafe, or stop and wait if weather conditions call for it - SECOR • Employ safe lifting procedures - SECOR • Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies - SECOR • Review permit conditions - SECOR
SPSA/PPE - Safe Performance Self Assessment or Plan Prevent Execute-ASSESS/PLAN the site and planned work activities for unforeseen or site specific safety concerns or new/changing conditions	If there is no potential for chemical exposure then Level D may be worn, hard hat, safety glasses with side shields, steel toed boots, reflective traffic vest, long sleeve shirts and long pants.If there is a potential for chemical contact than all the above apply as well as an Air-Purifying respirator with combination organic vapor/P-100 cartridges	ANALYZE/PREVENT Vehicle accident Traffic Hazards	• ACT/EXECUTE - SECOR • Coordinate with Site Manger (or designee) to minimize potential conflicts - SECOR • Review proposed locations - SECOR • Develop traffic guidance and control plan with the client and local agencies as applicable Plan may include use of delineators, barrier tape, jersey barriers, snow fence, etc - SECOR • It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available - SECOR

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g site managers, inspectors, clients, subcontractors, etc.) A tailgate safety meeting must be performed and documented at the beginning of each workday Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe All employees should act proactively to identify and mitigate hazards to the safest extent of their ability.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Determine survey locations	If there is no potential for chemical exposure then Level D may be worn, hard hat, safety glasses with side shields, steel toed boots, reflective traffic vest, long sleeve shirts and long pants If there is a potential for chemical contact than all the above apply as well as an Air-Purifying respirator with combination organic vapor/P-100 cartridges	Trips and falls, traffic hazards	• Observe walking surfaces carefully, walk in traversable areas when possible - SECOR • Make sure you are visible to others on-site by wearing safety vest, stand clear from moving equipment or traffic, and establish eye contact with operator when approaching - SECOR - SECOR
Set up necessary traffic guidance and control equipment	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves	Struck by vehicle during placement Vehicle accident as a result of improper traffic control equipment placement	• Use buddy system for placing traffic guidance and control equipment - SECOR • Implement traffic guidance and control plan such as setting out cones and tape defining safety area - SECOR • Adhere to approved Traffic Guidance and Control Plans when working in roadways and areas with vehicle traffic - SECOR • It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Guidance and Control configuration if a formally developed Traffic Guidance and Control Plan is not available - SECOR
Set up the survey equipment (site glass, laser, or GPS)	If there is no potential for chemical exposure then Level D may be worn, hard hat, safety glasses with side shields, steel toed boots, reflective traffic vest, long sleeve shirts and long pants If there is a potential for chemical contact than all the above apply as well as an Air-Purifying respirator with combination organic vapor/P-100 cartridges	Tripod pinch points, lifting hazards of survey equipment, muscle strain, damage to equipment	• Be knowledgeable of proper equipment set up. - SECOR • Use hand protection and proper lifting techniques (bend knees, keep back straight) and body positioning Keep loads close to body, avoid twisting torso, and use legs, not back, to lift loads - SECOR • Don't carry more than you can handle, and get help moving heavy or awkward objects - SECOR • Adhere to approved Traffic Guidance and Control Plans when working in roadways and areas with vehicle traffic - SECOR

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe All employees should act proactively to identify and mitigate hazards to the safest extent of their ability			
Job Steps	**Personal Protective Equipment**	**Potential Hazard**	**Critical Actions**
Survey the site	If there is no potential for chemical exposure then Level D may be worn, hard hat, safety glasses with side shields, steel toed boots, reflective traffic vest, long sleeve shirts and long pants If there is a potential for chemical contact than all the above apply as well as an Air-Purifying respirator with combination organic vapor/P-100 cartridges	Slips, trips and falls, traffic, tripod pinch points, lifting hazards of survey equipment, muscle strain, damage to equipment	• In traffic area, set up cones to define work area - SECOR • Watch where you step while moving around survey equipment, maintain good housekeeping, wear a reflective vest to be visible to others in the area - SECOR • Use proper body position while operating survey equipment - SECOR
NOTE WHEN ALL TERRAIN VEHICLE IS USED IN SURVEYING<>ONLY QUALIFIED PERSONNEL MAY OPERATE ATV	If there is no potential for chemical exposure then Level D may be worn, hard hat, safety glasses with side shields, steel toed boots, reflective traffic vest, long sleeve shirts and long pants If there is a potential for chemical contact than all the above apply as well as an Air-Purifying respirator with combination organic vapor/P-100 cartridges Wear an approved safety helmet All riders must be in a seat originally designed into the ATV	ATV overturning and trapping or being crushed under the ATV, abrasions, collision with other vehicles/landscaping	• Use only properly trained personnel - SECOR • Do not allow riders above ATV design capacity - SECOR • Wear appropriate PPE (helmet, leg protection if heavy underbrush and deadfall trees - SECOR • Operate at safe speeds and accelerate/ decelerate slowly, ascend/descend perpendicular to slope - SECOR
Supervisor/SHSO must confirm all monuments are closed	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves	Possible injuries and damage to property due to stepping into or driving over the well	•Visually inspect each and every monument - SECOR

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe All employees should act proactively to identify and mitigate hazards to the safest extent of their ability

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Clean site/demobilize	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary	Traffic Safety hazard left on site Lifting hazard	• Use buddy system as necessary to remove traffic guidance and control equipment - SECOR • Leave site clean of refuse and debris - SECOR • Notify station personnel of departure - SECOR • Use proper lifting techniques or use mechanical assistance - SECOR

Task 2 The following table addresses the concerns of GeoProbe sampling.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g. site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Clear drilling locations	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary Use disposable shoe covers similar (boots worn over steel toe boots) to prevent contact of the tar-like material with shoes.	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	• Reference Utility Clearance Review form (**Attachment 4**) • Coordinate with Site Manger (or designee) to minimize potential conflicts • Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc • Mark out the proposed borehole locations. • Call underground utility locating service for public line location clearance and get list of utilities being contacted If necessary, coordinate private line locator for private property. • Develop a traffic control plan with the client and local agencies as applicable Plan may include use of cones, barrier tape, jersey barriers, etc • **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if an Approved Traffic Control Plan is not available.**
Obtain sub-contractor equipment maintenance records prior to commencing work		Improper equipment maintenance, which can cause equipment failure and possible personal injury.	• Verify maintenance records in possession are for equipment on site • Verify maintenance is current
Mobilize with proper equipment/supplies for drilling	Gather necessary PPE. Reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, ear plugs/muffs, and leather gloves for the non-chemical aspects of work as necessary, Wear an appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges, and other PPE as needed (*Use a North 7600 series full face respirator or its equivalent Best brand nitrile gloves or their equivalent Howard Leight Max foam earplugs with an NRR of 33or their equivalent Tyvek, poly coated chemical resistant suit or it's equivalent).*	Vehicle accident. Lifting hazards Delay or improper performance of work due to improper equipment onsite.	• Start project with Production Safety Meeting (**Attachment 6**). • Follow safe driving procedures. • Employ safe lifting procedures. • Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies. • Review permit conditions
Visually clear proposed drilling locations	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Underground and overhead installations.	• Complete Pre-Mobilization section of Utility Clearance Review form (**Attachment 4**) and adjust drilling locations as necessary.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Set up necessary traffic control.	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary	Struck by vehicle during placement Vehicle accident as a result of improper traffic control equipment placement.	• Use buddy system for placing traffic control Implement traffic control plan such as setting out cones and tape defining safety area • It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if a separate diagram is not available • Adhere to approved Traffic Control Plans when working in roadways • **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if an Approved Traffic Control Plan is not available.**
Assist with set up of rig	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary	Vehicle accident during rig movement. Damage caused by rig while accessing set-up location. Contact with overhead installations Soft terrain Rig movement.	• All staff should know where the kill switch is for the drilling rig (incorporate into Production Safety Meeting (See **Attachment 6**)) • Verify clear pathway to drilling location and clearance for raising mast • Provide as-needed hand signals and guidance to driver to place rig • Visually inspect rig (fire extinguisher on board, no oil or other fluid leaks, cabling and associated equipment in good condition, pressurized hoses secured with whip-checks or adequate substitute, jacks in good condition?) • If necessary, use wooden blocks under jacks to spread load Chock wheels
Set up exclusion zone(s) and workstations (Hydropunch/Geoprobe and logging/sample collection)	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary	Struck by vehicle during set up Slip/fall hazards	• Implement exclusion zone set up • **It is the responsibility of the SHSO to annotate the Site Plan with the exclusion zone configuration.** • Set up workstations with clear walking paths to and from rig. Use safety tape and cones
Clear upper five feet of Hydropunch/Geoprobe location using post-hole digger or hand auger	Don required PPE as appropriate for this step steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary Wear chemical resistant gloves during handling of soil Wear an air-purifying respirator with combination organic vapor/HEPA P-100 cartridges if necessary. (*Use a North 7600 series full face respirator or its equivalent Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek poly coated chemical*	Back strain, exposure to chemical hazards, hitting an underground utility, repetitive motion	• Stand upwind to avoid exposure whenever possible • Initiate air quality monitoring in accordance with **Section 12** • Use the organic vapor monitor aggressively to track the airborne concentration of contaminants close to potential sources such as the core as it is being raised from the hole, the core is opened, etc • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available • Evaluate any soil samples inside a Ziploc bag at arm's length DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE. • Use proper lifting techniques and tools

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	resistant suit or it's equivalent)		• Complete the Pre-Drilling section of the Borehole Clearance Review form • Avoid twisting back during the operation, Decontaminate equipment after use Decontamination will be accomplished as indicated in the RI/FS Workplan Transfer waste generated to 55-gallon drums or poly tank and stage drums in the staging area
Commence Geoprobe/Hydropunch operation	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges if needed	Cross-contamination from previous hole Back strain, heat or cold, eye injury, noise, exposure to chemical hazards, hitting an underground utility, trip and fall, equipment failure	• Decontaminate sampling equipment after collecting a sample Decontaminate equipment after use Decontamination will be accomplished by an Alconox wash (or equivalent) with tap water rinse followed by a second tap water rinse, and a final rinse with distilled or de-ionized water. • Decontaminate Geoprobe/Hydropunch equipment after each evolution. (Subcontractor will decon equipment according to the RI/FS) • Use proper lifting techniques. • Monitor air quality in accordance with **Section 12**. • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available • Monitor Geoprobe/Hydropunch progress • Keep work area clear of tripping or slipping hazards. • Perform periodic visual inspections of Geoprobe/Hydropunch rig.
Collect samples in accordance with sampling plan	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed	Cross-contamination Back strain, inhalation or dermal exposure to chemical hazards, slip and fall Improper labeling or storage, injury from broken sample bottle (cuts or acid burn)	• Perform air monitoring in accordance with **Section 12.** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available • Decontaminate sampling equipment between each well and/(unless disposable). If the equipment is reusable, then wash in an Alconox wash (or equivalent) with tap water rinse followed by a second tap water rinse, and a final rinse with distilled or de-ionized water Decontamination water will be transferred to 55-gallon drums or poly tanks and staged in the storage area • Use proper lifting techniques. • Label samples in accordance with sampling plan • Keep samples stored in proper containers, at correct temperature, and away from work area. Handle bottles carefully.
Cuttings will be picked up by shovel and placed directly in 55-gallon drums	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical	Exposure to public Traffic hazard or obstruction/inconvenience to station operation Improper	• Have proper storage containment and labeling available onsite • Place materials in isolated location away from traffic and other site functions *(See next section for Waste Description).*

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered.

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
	aspects of work as necessary. If you suspect that equipment is contaminated, wear chemical resistant gloves.	storage or disposal Back strain	• Use appropriate drum handling practices Do not attempt to lift, push or move drums without the proper tools and equipment
Backfill borehole	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary	Improper grouting can lead to future vertical conduit for contaminant migration Back strain, trip hazards, and eye injury from splashing or release of pressurized grout Unauthorized backfilling causes extra work.	• Mix grout to specification and completely fill the hole • Use proper lifting techniques • Keep work area clear of tripping hazards
Dispose or store purge water (if any) onsite	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed	Back strain. Exposure to contaminants If disposing through onsite treatment system, damage or injury from improper use of equipment Improper storage or disposal.	• Use appropriate drum handling practices. • Use proper equipment to transport water (pumps, drum dollies, etc). • Monitor air quality in accordance with **Section 12** • Have appropriate respirator with combination organic vapor/HEPA cartridges within 3-5 feet of working location, readily available. • Label storage containers properly, and locate in isolated area away from traffic and other site functions • Coordinate offsite disposal (where applicable). • Do not attempt to lift, push or move drums without the proper tools or equipment.
Supervisor/HSC must confirm all boreholes are closed, filled in and/or capped		Possible injuries and damage to property due to stepping into or driving over the well	• Visually inspect each and every borehole
Clean site/demobilize	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary.	Traffic Safety hazard left on site. Lifting hazards	• Use buddy system as necessary to remove traffic control. • Leave site clean of refuse and debris • Clearly mark/barricade any borings that need later topping off or curing • Notify site personnel of departure, final well locations and any cuttings/purge water left onsite
Package and deliver samples to lab		Bottle breakage, back strain.	• Use proper lifting techniques • Handle and pack bottle carefully (bubble wrap bags are helpful). Use proper lifting techniques

Task 3 The following table addresses the concerns of soil and groundwater sampling. This also includes installation of wells.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Clear drilling locations	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary	Traffic hazards, overhead and underground installations, product releases, property damage, dealer inconvenience.	• Reference Utility Clearance Review form (**Attachment 4**) • Coordinate with Site Manger (or designee) to minimize potential conflicts • Review proposed locations against available construction drawings and known utilities, tanks, product lines, etc. • Mark out the proposed borehole locations • Call underground utility locating service for public line location clearance and get list of utilities being contacted If necessary, coordinate private line locator for private property • Develop a traffic control plan with the client and local agencies as applicable. Plan may include use of cones, delineators, barrier tape, jersey barriers, etc • **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if a formally developed Traffic Control Plan is not available.**
Obtain sub-contractor equipment maintenance records prior to commencing work		Improper equipment maintenance, which can cause equipment failure and possible personal injury	• Verify records in possession are for equipment on site • Verify maintenance is current
Mobilize with proper equipment/supplies for drilling	Gather necessary PPE Reflective vest for traffic, steel toed and shank shoes, hard hat, safety glasses with side shields, ear plugs/muffs, leather gloves for the non-chemical aspects of work as necessary, Wear an air purifying respirator with combination organic vapor/HEPA P-100 cartridges, and other PPE as needed (*Use a North 7600 series full face respirator or its equivalent Best brand nitrile gloves or their equivalent Howard Leight Max foam earplugs with an NRR of 33 or their equivalent. Tyvek, poly coated chemical resistant suit or it's equivalent).*	Vehicle accident. Lifting hazards Delay or improper performance of work due to improper equipment onsite.	• Start project with Production Safety Meeting (**Attachment 6**). • Follow safe driving procedures. • Employ safe lifting procedures. • Make sure sub-contractors are aware of their responsibilities for labor, equipment and supplies. • Review permit conditions
Visually clear proposed drilling	Wear reflective vest for traffic, steel	Underground and overhead	• Complete Pre-Mobilization section of Utility Clearance Review form

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
locations	toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	installations	(**Attachment 4**) and adjust drilling locations as necessary
Set up necessary traffic control	**Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields,** and leather gloves as necessary.	Struck by vehicle during placement. Vehicle accident as a result of improper traffic control equipment placement	• Use buddy system for placing traffic control Implement traffic control plan such as setting out delineators, snow fence and tape defining safety area • Adhere to approved Traffic Control Plans when working in roadways. • **It is the responsibility of the SHSO to annotate the Site Plan with the Traffic Control configuration if a formally developed Traffic Control Plan is not available.**
Assist with set up of rig	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary.	Vehicle accident during rig movement Damage caused by rig while accessing set-up location Contact with overhead installations Soft terrain Rig movement	• Rig mast must be down when moving/repositioning rig • All staff should know where the kill switch is for the drilling rig. • Verify clear pathway to drilling location and clearance for raising mast • Provide as-needed hand signals and guidance to driver to place rig • Visually inspect rig (fire extinguisher on board, no oil or other fluid leaks, cabling and associated equipment in good condition, pressurized hoses secured with whip-checks or adequate substitute, jacks in good condition?). • If necessary, use wooden blocks under jacks to spread load Chock wheels.
Set up exclusion zone(s) and workstations (drilling and logging/sample collection)	Wear reflective vest for traffic, steel toed and shank shoes, hardhat, safety glasses with side shields, and leather gloves as necessary	Struck by vehicle during set up. Slip, trip and fall hazards	• Implement exclusion zone set-up **It is the responsibility of the SHSO to annotate the Site Plan with the Exclusion Zone set up.** • Set up workstations with clear walking paths to and from rig. Use safety tape and delineators. • If utilizing Visqueen, (sheet plastic), for sampling area, completely secure Visqueen to the pavement, dirt, etc with duct tape, delineators, etc Do not use objects that are hard to notice or could become a trip hazard themselves
Clear upper five feet of drilling location using post-hole digger or hand auger	Don required PPE as appropriate for this step. steel toed and shank shoes, hard hat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary Wear chemical resistant gloves during handling of soil Wear an air-purifying respirator with combination organic	Back strain, exposure to chemical hazards, hitting an underground utility, repetitive motion	• Initiate air quality monitoring as outlined in **Section 12.** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available • Stand upwind to avoid exposure whenever possible. • Use the organic vapor monitor aggressively to track the airborne concentration of contaminants close to potential sources such as the core as it is being raised from the hole, the core is opened, etc. • Evaluate any soil samples inside a Ziploc bag at arm's length DO NOT

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	vapor/HEPA P-100 cartridges if necessary (*Use a North 7600 series full face respirator or its equivalent Best brand nitrile gloves or their equivalent. Howard Leight Max foam earplugs with an NRR of 33 or their equivalent Tyvek poly coated suit or it's equivalent)*		EVALUATE THE SAMPLE WITH THE BAG OPEN THIS WILL AVOID UNNECESSARY EXPOSURE • Use proper lifting techniques and tools. • Complete the Pre-Drilling section of the Borehole Clearance Review form • Avoid twisting back during the operation, Decontaminate equipment after use. Decontamination will be accomplished as given in the RI/FS. Collect rinse water in 5 gallon buckets and transfer to 55-gallon drums or poly tank and stage in the storage area.
Commence drilling operation.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges if needed Wear chemical resistant gloves if needed	Cross-contamination from previous hole. Back strain, heat or cold, eye injury, noise, exposure to chemical hazards, hitting an underground utility, slips, trips and falls, equipment failure	• Decontaminate sampling after collecting a sample and decontaminate drilling equipment after each borehole. • Use proper lifting techniques • Conduct air monitoring as outlined in **Section 12** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available. • Monitor drilling progress • Keep work area clear of tripping or slipping hazards • Perform periodic visual inspections of drill rig.
Collect samples in accordance with sampling plan	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges if needed	Cross-contamination, improper labeling or storage, exposure to site contaminants	• Evaluate any soil samples inside a Ziploc bag at arm's length DO NOT EVALUATE THE SAMPLE WITH THE BAG OPEN. THIS WILL AVOID UNNECESSARY EXPOSURE. • Decontaminate sampling equipment between each sampling run Label samples in accordance with sampling plan • Keep samples stored in proper containers, at *correct temperature*, and away from work area. • Conduct air monitoring as outlined in **Section 12.** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available
Cuttings will be picked up by shovel and placed directly in 55-gallon drums	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary If you suspect that equipment is	Exposure to public Traffic hazard or obstruction/inconvenience to station operation. Improper storage or disposal Back strain	• Have *proper storage containment* and labeling available onsite Place materials in isolated location away from traffic and other site functions *(See next section for Waste Description)* • Do not attempt to lift, push or move drums without the proper tools and equipment

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday. Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	contaminated, wear chemical resistant gloves Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed		• Conduct air monitoring as outlined in **Section 12.** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available
Construct well	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary	Back strain, eye injury, slip, trip and fall hazards. Cross-contamination Non-approved well construction.	• Use proper lifting techniques. • Keep pathways from well supplies to borehole clear of tripping hazards • Make sure casing and other materials are clean before going into borehole. • Verify presence or other authorization by any required inspectors for well installation/grouting
Cut pavement to set well vault	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work If you suspect that equipment is contaminated, wear chemical resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed	Moving blade, eye hazards, exhaust from motor, noise, back strain Particulate inhalation Traffic hazards	• Employ proper lifting techniques or mechanical assistance. • Keep work area clear of debris • Maintain traffic control and face oncoming traffic • Conduct air monitoring as outlined in **Section 12** • Have appropriate respirator with combination organic vapor/HEPAP-100 cartridges within 3-5 feet of work area, readily available.
Install well vault and set in concrete	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary If you suspect that equipment is contaminated, wear chemical resistant gloves Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed	Back strain, eye injury, skin exposure to concrete, particulate inhalation, slip, trip and fall hazards Traffic hazards	• Use proper lifting technique and equipment to install well vault and in concrete preparation. • Complete well vault smooth to grade to eliminate trip hazard (if slightly elevated to prevent storm water intrusion, slope concrete skirt gradually) • Maintain traffic control and face oncoming traffic • Perform air monitoring as outlined in **Section 12.** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available.
Develop well by hand bail, surge and bail, or vacuum truck	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary Wear appropriate air purifying	Physical injury from mechanical failure vacuum truck. Trip hazard. Exposure to contaminants. Cross-contamination Electric shock Back strain.	• Make sure equipment is in good working order and pressurized hoses are whip-checked • Perform air monitoring as outlined in **Attachment 6.** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	respirator with combination organic vapor/HEPA P-100 cartridges as *needed*		• Keep work area orderly • Decontaminate all equipment going into well. • Any generators must be equipped with GFCI circuit
Gauge water levels and product thickness (where applicable) in wells	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed Wear chemical resistant suit as needed	Back strain, inhalation or dermal exposure to chemical hazards, repetitive motion.	• Perform air monitoring as outlined in **Attachment 6.** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of working location for quick access • Maintain safe distance from wellhead. • Bend at knees, not at the waist
Purge well(s) and collect purge water *Purging of the wells can be done by using one of three methods, hand bailer, low flow purge, or vacuum truck Collected water will be transferred to a 55-gallon drums or poly tanks and staged in the storage area*	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work. If you suspect that equipment is contaminated, wear chemical resistant gloves as necessary. Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed Wear chemical resistant suit as needed	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall Spilling contaminated water	• Decontaminate purging equipment between each sampling location. Two *methods of equipment decontamination will be used on this site* If disposable bailers are used, then they will be properly disposed of If the bailers are reusable, then they will be washed as required in the RI/FS Decontamination water will be transferred to 55-gallon drums or poly tank and staged in the storage area. • Use proper lifting techniques • *Perform air monitoring* as outlined in **Section 12** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of working location , readily available • Keep work area clear of tripping or slipping hazards • Store purge water in 55-gallon drums or poly tanks and stage in the storage area.
Collect groundwater samples in accordance with sampling plan	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA cartridges as needed	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall Improper labeling or storage, injury from broken sample bottle (cuts or acid burn).	• Decontaminate sampling equipment between each well (unless disposable). • Use proper lifting techniques. • Perform air monitoring as outlined in **Section 12.** • *Have appropriate respirator with combination organic vapor/HEPA* cartridges within 3-5 feet of working location for quick access • Label samples in accordance with sampling plan. • Keep samples stored in proper containers, at correct temperature, and away from work area Handle bottles carefully.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g. site managers, inspectors, clients, subcontractors, etc.). A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
Dispose or store purge water (if any) onsite	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed.	Back strain Exposure to contaminants If disposing through onsite treatment system, damage or injury from improper use of equipment Improper storage or disposal.	• Use proper equipment to transport water (pumps, drum dollies, etc) • Perform air monitoring as outlined in **Section 12** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of working location for quick access • Label storage containers properly, and locate in isolated area away from traffic and other site functions • Coordinate offsite disposal (where applicable). • Do not attempt to lift, push or move drums without the proper tools or equipment.
Supervisor/HSC must confirm all boreholes are closed, filled in and/or capped.		Possible injuries and damage to property due to stepping into or driving over the well.	• Visually inspect each and every borehole
Clean site/demobilize	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary	Traffic Safety hazard left on site Lifting hazards.	• Use buddy system as necessary to remove traffic control • Leave site clean of refuse and debris • Clearly mark/barricade any borings that need later topping off or curing • Notify site personnel of departure, final well locations and any cuttings/purge water left onsite.
Package and deliver samples to lab		Bottle breakage, back strain	• Use proper lifting techniques • Handle and pack bottle carefully (bubble wrap bags are helpful). Use proper lifting techniques

Task 4: The following table addresses the concerns of well development.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g site managers, inspectors, clients, subcontractors, etc.) A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Develop well by hand bailing, vacuum truck or surge block	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed.	Physical injury from mechanical failure vacuum truck Trip hazard. Exposure to contaminants Cross-contamination. Electric shock Back strain.	• Make sure equipment is in good working order and pressurized hoses are whip-checked. • Perform air monitoring as outlined in **Attachment 6** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of work area, readily available. • Keep work area orderly. • Decontaminate all equipment going into well. • Any generators must be equipped with GFCI circuit
Gauge water levels and product thickness (where applicable) in wells.	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed. Wear chemical resistant suit as needed	Back strain, inhalation or dermal exposure to chemical hazards, repetitive motion.	• Perform air monitoring as outlined in **Attachment 6** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of working location for quick access • Maintain safe distance from wellhead. • Bend at knees, not at the waist
Purge well(s) and collect purge water Purging of the wells can be done by using one of three methods, by hand bailer, surge block, or vacuum truck If a hand bailer or surge block is used, collected water will be transferred to a 55-gallon drum	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and leather gloves for the non-chemical aspects of work If you suspect that equipment is contaminated, wear chemical resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed. Wear chemical resistant suit as needed	Cross-contamination Back strain, inhalation or dermal exposure to chemical hazards, slip and fall Spilling contaminated water	• Decontaminate purging equipment between each sampling location Two methods of equipment decontamination will be used on this site If disposable bailers are used, then they will be properly disposed of If the bailers are reusable, then they will be washed in an Alconox wash, rinsed with tap water, then rinsed with de-ionized or distilled water. Decontamination water will be transferred to 55-gallon drums and staged • Use proper lifting techniques. • Perform air monitoring as outlined in **Section 12.** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of working location , readily available • Keep work area clear of tripping or slipping hazards. • Store purge water in 55-gallon drums and stage
Collect groundwater samples in accordance with sampling plan	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical	Cross-contamination. Back strain, inhalation or dermal exposure to chemical hazards, slip and fall. Improper labeling	• Decontaminate sampling equipment between each well (unless disposable) • Use proper lifting techniques.

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Safe Performance Self Assessment (SPSA) procedures must be used throughout the project. Weather conditions (heat, cold, rain, lightning) must also be considered.

❶ Job Steps	❷ Personal Protective Equipment	❸ Potential Hazard	❹ Critical Actions
	resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA cartridges as needed	or storage, injury from broken sample bottle (cuts or acid burn).	• Perform air monitoring as outlined in **Section 12** • Have appropriate respirator with combination organic vapor/HEPA cartridges within 3-5 feet of working location for quick access. • Label samples in accordance with sampling plan • Keep samples stored in proper containers, at correct temperature, and away from work area. Handle bottles carefully.
Dispose or store purge water (if any) onsite	Steel toed and shank shoes, hardhat, safety glasses with side shields, hearing protection, reflective safety vest, and chemical resistant gloves as necessary Wear appropriate air purifying respirator with combination organic vapor/HEPA P-100 cartridges as needed	Back strain Exposure to contaminants If disposing through onsite treatment system, damage or injury from improper use of equipment. Improper storage or disposal.	• Use proper equipment to transport water (pumps, drum dollies, etc.) • Perform air monitoring as outlined in **Section 12.** • Have appropriate respirator with combination organic vapor/HEPA P-100 cartridges within 3-5 feet of working location for quick access • Label storage containers properly, and locate in isolated area away from traffic and other site functions • Coordinate offsite disposal (where applicable). • Do not attempt to lift, push or move drums without the proper tools or equipment.

GENERAL Driving a motor vehicle

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g. site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe All employees should act proactively to identify and mitigate hazards to the safest extent of their ability

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
PRE-TRIP - Review PPE/SPSA Card	Window scraper	Consider worst case outcome of vehicle operation (blowout, breakdown, collision, slippery surfaces, injury or death)	• Assess the potential hazards Analyze how to reduce the risk Act to ensure safe operation of the vehicle SECOR/Contractor
Verify Journey Management Plan is complete and current		Unexpected traffic detours	• Assure directions are available and understood prior to commencing travel SECOR/Contractor • Pull the vehicle into a safe location if additional directions must be confirmed SECOR/Contractor • Increase following distance to allow extra time to stop if you are in unfamiliar territory SECOR/Contractor
Verify a Vehicle Collision Kit, a 3-lb type ABC fire extinguisher and other as needed emergency equipment is in the vehicle	Fire Extinguisher	Fire in vehicle, vehicle incident	• Verify prepared field kit is in the vehicle Inventory of the kit should include first aid kit, blood borne pathogen kit, fire extinguisher, collision kit, flashlight, sampling tools, etc SECOR/Contractor • For cold weather areas the inventory should also include a bag of sand, a bag of salt, gloves, wool socks, wool caps, wool blankets, tire chains, small shovel and matches
Perform perimeter walk around of vehicle for damage or unusual conditions	Window scraper	Flat tire, blowout, impaired vision, collision, slippery surfaces, injury or death	• Use SECOR Vehicle Daily Inspection Report SECOR/Contractor • Assure tires are properly inflated and there is sufficient tread SECOR/Contractor. • Assure there are no cuts or bulges in the sidewalls SECOR/Contractor • Assure windshield and window glass is clean SECOR/Contractor • Lift wiper arms and check wiper blades for damage or deterioration SECOR/Contractor • Check behind vehicle for obstructions SECOR/Contractor • Check under vehicle engine for evidence of fluid leaks SECOR/Contractor • Do not touch metal with moist or wet skin SECOR/Contractor • Scrape windows, front and rear windshields SECOR/Contractor

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe All employees should act proactively to identify and mitigate hazards to the safest extent of their ability

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Check and adjust seat, mirrors, headlamps, turn signals, washer/wipers	Window scraper	Back or body strain Blind spots Inability to signal intentions. Streaking windshield, impaired vision	• Adjust seat so back is fully supported, upper arms close to body, pedals within easy reach SECOR/Contractor • Lower steering wheel so hands are below shoulders and shoulders are relaxed SECOR/Contractor • Check mirror adjustments each time vehicle is re-started SECOR/Contractor • Test operations of front and rear turn signals SECOR/Contractor SECOR/Contractor • Locate and test operation of headlamps, wiper and washer switches SECOR/Contractor • Verify heater and windshield defroster fan operates properly SECOR/Contractor
Check and verify emergency equipment		Unexpected situations	• Have within the vehicle, and maintain the integrity of, a first aid and blood borne pathogen kit and an eye wash bottle SECOR/Contractor • Fire extinguisher SECOR/Contractor
Site specific emergency equipment		Unexpected situations	• When applicable, each vehicle is to be outfitted with site specific emergency equipment in the vehicle (i e snake bit kit, hypothermia kit) SECOR/Contractor
Fasten seat belts		Increased risk of more serious injury or death in collision	• Assure seat belt is in good condition and fastened SECOR/Contractor • Assure all passenger seat belts are in good condition and fastened SECOR/Contractor.
Lock doors		Ejection from vehicle in collision Unwanted intrusion	• Lock all doors to vehicle SECOR/Contractor
Cellular Phone Usage		Driver distractions and static electric discharge that could lead to preventable incidents	• Always turn cellular phones to the off position before starting the engine SECOR/Contractor • Do not use cellular phones when refueling SECOR/Contractor
Start engine and let vehicle warm up		Unexpected movement	• Refer to Manufacturers vehicle manual for warm up times SECOR/Contractor • Assure that transmission is in 'Park' or neutral if a standard transmission and that parking brake is set SECOR/Contractor

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e.g. site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe All employees should act proactively to identify and mitigate hazards to the safest extent of their ability

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Check heater, defroster, gauges and warning lights		Overheated engine or break-down due to lack of critical fluids Brake failure Stranding	• Assure there is sufficient gas, oil and other critical fluids SECOR/Contractor
Pull out of parking space		Collision with other vehicles, pedestrians, or stationary objects	• Check mirrors and over shoulder in all directions prior to pulling out of parking space SECOR/Contractor • Signal if parallel parked along a street SECOR/Contractor • If reversing with 2 or more personnel in the vehicle, then at least 1 person must exit the vehicle and act as a spotter If alone before getting in the car, assess the area looking for approaching pedestrians/vehicles When clear get in vehicle, do a 360 scan then put in gear While looking over your shoulder, slowly back out of the parking space being prepared to apply the brakes if needed SECOR/Contractor
DURING TRIP Scan Move your eyes		Collision, injury or death to occupants or other parties	• Move eyes at least every 2 seconds SECOR/Contractor • Scan major and minor intersections before entry (left-right-left) SECOR/Contractor • Check mirrors when slowing or stopping vehicle SECOR/Contractor • Scan mirrors frequently, at least one mirror every 5-8 seconds SECOR/Contractor. • Avoid staring while evaluating road conditions SECOR/Contractor • Maintain adequate spacing between your vehicle and the vehicle in front of you (Rule of thumb one second for every 10 miles per hour, minimum of 3 seconds), double the distance during poor road conditions) SECOR/Contractor • Watch for ice on road, slow down before hitting the ice, keep your foot off the brake SECOR/Contractor
Elevate elevate your line sight		Collision, injury or death to occupants or other parties	• Maintain 12 second eye lead time (1 1/2 blocks in city traffic, 1/4 mile in highway traffic) Assess condition of traffic lights (fresh vs stale) SECOR/Contractor • Assess information from distant objects SECOR/Contractor • Adjust eye lead distance to speed SECOR/Contractor • Watch for ice on road, slow down before hitting the ice, keep your foot off the brake SECOR/Contractor

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe All employees should act proactively to identify and mitigate hazards to the safest extent of their ability

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Count keep your distance		Collision, injury or death to occupants or other parties	• Maintain safety cushion around vehicle (front, sides, rear) SECOR/Contractor • Adjust vehicle space and speed to avoid unsafe intrusion by other drivers SECOR/Contractor • At signal controlled intersections, stop 10 feet behind crosswalks or behind other vehicles SECOR/Contractor • When stopped, allow vehicle in front to move for 3 seconds before accelerating SECOR/Contractor • Observe approaching merge areas and choose lane of least resistance SECOR/Contractor • Cede right of way and allow for other vehicles to merge, change lanes, make turns, etc SECOR/Contractor • Watch for ice on road, slow down before hitting the ice, keep your foot off the brake SECOR/Contractor
Out have a way out		Collision, injury or death to occupants or other parties	• Avoid being unnecessarily boxed in SECOR/Contractor • Avoid sudden acceleration and deceleration SECOR/Contractor • Maintain 1 second for every 10 mph (with 3 second minimum) following distance, adjust speed to traffic conditions, scan immediate and adjacent lanes before merging SECOR/Contractor
Recognize - make sure others see you		Collision, injury or death to occupants or other parties	• Seek eye contact with other drivers SECOR/Contractor • Cover or use horn when conditions warrant SECOR/Contractor • Before changing lanes, signal well in advance, check mirrors and over shoulder, and allow adequate space before changing lanes SECOR/Contractor • Break early to activate brake lights SECOR/Contractor • Stay out of blind spots Gently sound horn or flash lights if unsure other driver sees you SECOR/Contractor • Turn on headlamps in high traffic areas, at dusk, and in inclement weather Do not over drive your headlights SECOR/Contractor • Increase the distance between your vehicle and the vehicle in front of you at night SECOR/Contractor

Field staff must review job-specific work plan and coordinate with project manager to verify that all up-front logistics are completed prior to starting work including, but not limited to, permitting, access agreements, and notification to required contacts (e g site managers, inspectors, clients, subcontractors, etc) A tailgate safety meeting must be performed and documented at the beginning of each workday Plan, Prevent, Execute (PPE)/Safe Performance Self Assessment (SPSA) procedures must be used throughout the project Weather conditions (heat, cold, rain, lightning) must also be considered Each employee is empowered, expected, and has the responsibility to stop the work performed by him/herself or another co-worker if the working conditions or behaviors are considered unsafe All employees should act proactively to identify and mitigate hazards to the safest extent of their ability

Job Steps	Personal Protective Equipment	Potential Hazard	Critical Actions
Backing up		Collision, injury or death to occupants or other parties	• Make all backing maneuvers slowly and cautiously SECOR/Contractor • Check mirrors and over shoulders When parking, look for pull-through parking to avoid backing SECOR/Contractor • If reversing with 2 or more personnel in the vehicle, then at least 1 person must exit the vehicle and act as a spotter If alone before getting in the car, assess the area looking for approaching pedestrians/vehicles When clear get in vehicle, do a 360 scan then put in gear Give 2 short honks of the horn, while looking over your shoulder, slowly back out of the parking space being prepared to apply the brakes if needed SECOR/Contractor
Pay attention to driving at all times		Collision, injury or death to occupants or other parties	• Always focus on driving Stop driving if you become distracted SECOR/Contractor • Refrain from conducting involved or emotional discussions while driving - end the conversation or pull over to the side of the road if it becomes difficult to concentrate on driving while conversing with your passengers SECOR/Contractor
Parking		Collision, injury or death to occupants or other parties	• Park away from other cars SECOR/Contractor • Back into parking spot when possible and safe SECOR/Contractor • If reversing with 2 or more personnel in the vehicle, then at least 1 person must exit the vehicle and act as a spotter If alone before getting in the car, assess the area looking for approaching pedestrians/vehicles When clear get in vehicle, do a 360 scan then put in gear Give 2 short honks on the horn, while looking over your shoulder, slowly back out of the parking space being prepared to apply the brakes if needed SECOR/Contractor • Maintain cushion of safety from fixed objects Set parking brake SECOR/Contractor
POST-TRIP - Report maintenance or mechanical problems upon returning vehicle		Conditions worsen leading to mechanical failure resulting in accident, injury or death	• Report vehicle problems immediately to company representative or rental car agency SECOR/Contractor

14.0 WASTE CHARACTERISTICS

A. Waste Generation (Type(s)/Quantities Expected)

Anticipated (YES/NO) ____

Types Liquid __X__ Solid __X__ Sludge ____ Other (describe) _____

Quantity (Expected Volume) _____unknown_____

B. Characteristics (Expected)

Corrosive ____ Flammable/Ignitable ____ Radioactive ____ Toxic __X____

Reactive ____ Unknown ___

Other (specify) _____

C. Packaging requirements for waste material (Expected)

- DOT-approved drums X____
- Baker tanks—water (possibly tankers if trucked off site) ___X____
- Lined waste bins ____
- Excavated soil will be temporarily stockpiled and then trucked for disposal
- 5 gallon buckets ____

D. Disposal and/or Treatment Methods Proposed:

All wastes will be sampled and analyzed Results of analysis will determine how and where impacted materials may be disposed of All materials will be disposed of or treated in accordance with federal, state and local regulations as selected and arranged by **BP ARCO** to the appropriate treatment, storage or disposal facility **ARCO** personnel will be responsible for signing the manifest

ATTACHMENT 1

CLIENT'S SAFETY PROCEDURES

C.A.R.E. CARD

Corrective Action Risk Elimination

WEST SAFETY REINFORCEMENT PLAN

bp

"no accidents, no harm to people, and no damage to the environment"

Use this card daily to achieve this objective!

Remember to Stop! and Perform the Triple A

TRIPLE A

Before every task, immediately after every incident, and before beginning any unfamiliar process

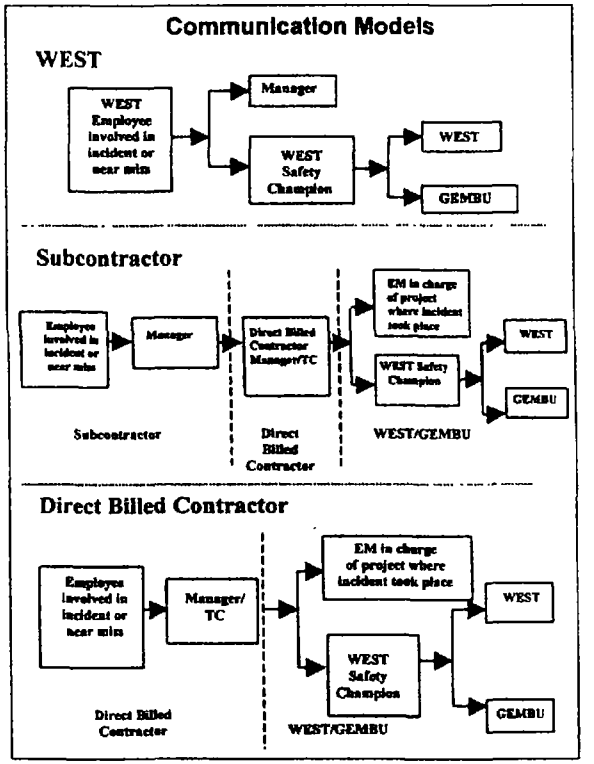
Step 1 *ASSESS* the risk

Step 2 [illegible] all potential hazards

Step 3 *ACT* to eliminate the risk before proceeding

Safe Behavior Observations
Near Miss Investigations/Shared Learning Process
Incident Investigations/Shared Learning Process
Near Miss/Incident Investigation Instructions

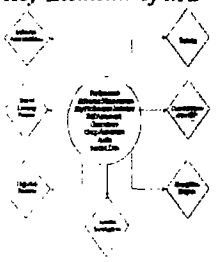
- Notify WEST personnel within 24 hours
- Follow written procedure
- Use Near Miss / Incident Investigation Form
- Follow Root Cause Analysis (see Supervisor Guide) to define appropriate corrective actions
- Publish Shared Learning according to communication models (see other side)



BPACC01766

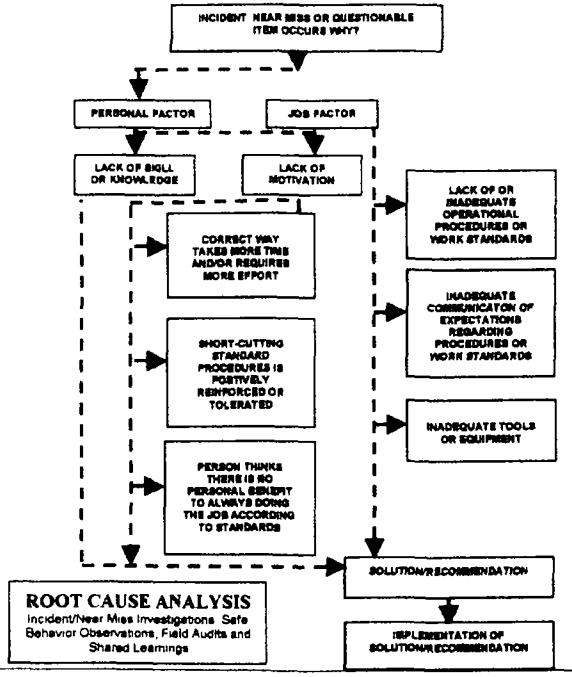
Safety Reinforcement Plan
Supervisor's Guide

Key Elements of SRP



As a supervisor within the GEMBU, this guide will assist you in implementing and sustaining the safe behavior based culture driven by the SRP. The communication models found in the SRP and the root cause analyses below are used to derive and share appropriate safety information with the GEMBU. The Supervisor Feedback Guide on the reverse should be used to conclude all Safe Behavior Observations. As you champion these principles, you improve the safety of *all BP employees and our customers!*

Root Cause Analysis



Supervisor's Feedback Guide

Review this checklist prior to a safe behavior observation feedback session

Tips for effective feedback
- Conduct the feedback session immediately after the observation is completed
- Maintain eye contact
- Use the 4 positives to 1 negative reinforcement rule
- Be specific, give examples

Opening statement: The reason for conducting the observation...
- *Identify and correct questionable items*
- Reinforce observations as positive

Review positives from the observation and their benefits to the individual and the organization
- Mention specific behaviors that are significantly critical to safe performance
- Emphasize the percentage of tasks observed as performed correctly

Discuss any questionable items from the observation
- All parties agree that a questionable item exists
- Relate questionable activities to potential consequences (i.e. spills, injury, etc.)
- Describe the deviation from the standard

Identify the root causes of questionable items
- All parties agree to the root causes
- Ensure that each questionable item has an identified root cause

Develop a solution and an action plan
- Each root cause must have a solution, owner and due date
- Solutions should be practical and sustainable

Closing statement (60 seconds or less)
- Review reason for conducting observation
- Review positive aspects of observation
- Review consequences of questionable items
- Thank all participants
- Restate root causes and solutions
- Give the observer feedback on the quality of the observation

Remediation Management Authorization to Work (ATW) Instructions

All field work undertaken for Remediation Management will be done under an Authorization to Work (ATW) form. The ATW needs to be completed before the work commences each day and covers the task to be completed in the period covered by the form and stipulates the Control of Work procedures and permits required. Authorization to Work forms can be self-authorized for all work not requiring a permit. When a permit is required, it can only be signed by a person authorized to do so and can not be the person doing the work An ATW is only valid when all required signed permits are attached to it. Copies of all issued ATW permits are to be kept with the HASP for the project

Completing the ATW form:

Pre-Task Hazard Review: All of the tasks to be completed under this form are to be listed, the JSA's for those tasks reviewed, and the Equipment to be used for each task listed
The hazards of the tasks are to be checked of on the sheet (Chemical/Products/Material, Hazardous Energy, and Other Potential Hazards) and discussed with the team
Anyone coming on to the work site needs to have a full understanding of the hazards
All applicable safety precautions should be checked and discussed with the team (including PPE required). The PPE and other safety precautions need to be in place for anyone coming on site Any exceptions made to these requirements need to be noted

Required Procedures: All of the Control of Work Procedures that apply to the tasks being performed are to be checked and the procedures reviewed.
Before any drilling work is undertaken the Drilling Procedure information needs to be reviewed and the Pre-Drilling Checklist completed and attached to the ATW
Any changes to the scope of work and work outside the JSA conditions needs to undergo an analysis using the MOC procedures
Any work being done in congested areas, public right of ways, and retail forecourts need to follow the traffic control procedures
Any work requiring energy isolation needs to follow the LO/TO procedures
Any work that involved lifting needs to follow the hoisting/lifting procedures.
Workers traveling alone to a remote work site need to complete a Journey Hazard Assessment and attach it to the ATW.

Required Permits: All permits that apply to the tasks being completed need to be checked, and the permits need to be obtained before the work commences. The ATW for work requiring a permit can not be self-authorized. Once completed, all permits required for the work need to be attached to the ATW Permits are required for all tasks involving Hot Work, Ground Disturbance, Confined Spaces, and Working From Height.

Signatures: An ATW is only valid with an authorization signature When a permit is required the authorization signature is that of the permit writer otherwise it is either the project manager or person in charge of the work. The ATW should stipulate its effective period and describe the work site location in enough to effectively identify where the work is being done Work should not be authorized unless a Health and Safety plan, an Emergency Response Plan (could be part of the HASP), and the applicable JSAs are on site Anyone coming on site needs to review the ATW and sign to attest that they understand the content

PRINT OUT ATW AND INSERT HERE

ATTACHMENT 2

SITE PLAN(s)

ATTACHMENT 3

NOTE. BLUE areas are filled in for all reports!

Near Miss Type

15.0 ☐ **NEAR MISS /HSE OPPORTUNITY** ☐ **SECURITY: Select Type**

☐ **Occupational Injury or Illness**
☐ **Transportation: Select type**
☐ **Complaints –Public / Third Party**
☐ **Compliance / Conformance –Environmental Event**
☐ **Material Release**
☐ **Loss or Damage: Select Type**

16.0 LOCATION 1: Select Location **LOCATION 2: Select Location 2**

17.0 LOCATION 3: JOB NUMBER EBM

Station Number/Terminal Name Street Address City State Zip

18.0 GENERAL INFORMATION:

Date Occurred Time Occurred Date Reported Time Reported

Reported By
Job Title
Reported to
Job Title
Contact Number

Primary Company Involved

Event Description: (No more than 7 lines, do not include "SECOR" or pronouns i.e. he, she etc.)

Category: Select Category **Operation in Progress: Select Operation**

Immediate Action Taken: (What was the first thing you did to react to the incident)

Ground Conditions: Select Condition **Weather Conditions: Select Condition**

19.0 SEVERE WEATHER CONDITIONS: Select Condition

Lighting: Select Lighting

19.1 **HSE** (See BPs "getting HSE right")

Failed Expectation = 1 Failed Expectation = 2 Failed Expectation = 3

19.2 ROOT CAUSE ANALYSIS:

#	ROOT CAUSE and CONTRIBUTING FACTORS: Conclusion (Describe in Detail Why Incident/Near Miss Occurred).

ROOT CAUSE(S) ANALYSIS (RCAF):	

1 Lack of skill or knowledge	5 Current way takes more time and/or requires more effort
2 Lack of or inadequate operational procedures or work standards	6 Short cutting standard procedures is positively reinforced or tolerated
3 Inadequate communication of expectations regarding procedures or work standards	7 Person thinks there is no personal benefit to always doing the job according to standards
4 Inadequate tools or equipment	8 Uncontrollable

#	19.2.1.1 RCA #	Solution(s): How to Prevent Incident/Near Miss from Reoccurring	19.2.1.2 19.2.1.3 Person Responsible	19.2.1.4 Due Date	19.2.1.5 Closure Date

19.2.1.5.1 Investigation Team Members		
19.2.1.5.2 Name	19.2.1.6 Job Title	19.2.1.7 Date

19.2.1.7.1 Results of Solution Verification and Validation

19.2.1.7.2 Reviewed By		
19.2.1.7.3 Name	19.2.1.8 Job Title	19.2.1.9 Date

End of Basic Near Miss Form.

If Media Emergency Services or Regulatory Agencies were contacted complete "Other Information" section
For an injury or illness complete "Injury - Illness Info" section
For a Material Spill and or Release complete "Material Spill - Release" section
For an Environmental Event complete "Environmental Event - Section
For a Vehicle Incident complete "Vehicle Incident" section
For 3rd Party Transport Incidents complete "3rd Party Transport Incident" section

Other Information: (Only fill out if Media, Emergency Services or Regulatory Authorities are notified)

Media Involvement: Select Type **Media Comments:**

External Emergency Services Contacted: Select Type

Regulatory Authorities Notified: Select Type

Type of Report: Select Type **Report Number:** **Report Status:** Select

Drug & Alcohol Test Mandatory: ☐ Yes ☐ No

Injury/Illness Info: (Only fill out if there is an injury or illness involved)

Name Date of Birth Employee # Gender Select Occupation
Experience Years

Location Type: Select Type

Continuous Days Worked Number of Days Away from Work Number of Days Light Duty/Job Transfer

Worker Type: Select Type **Classification:** Select Type **Treatment:** Select Type

Type of Contact: Select Type **Body Part(s) Affected:** **Nature of Injury:**

Incident Function: Select Type **Hospital Attended:** ☐ Yes ☐ No

Hospital Address: **Hospital Phone Number:**

19.3
19 4 **Material Spill/Release** (Fill out if there is a material spill / release)

Release Type: Select Type **Secondary Containment Breached:** ☐ Yes ☐ No

Atmospheric Conditions:
Wind Direction Wind Speed (MPH) Temp (F) Barometric Pressure. (Inches) Humidity.

Material Released: **Quantity Released:** (Gals) **Quantity Recovered:** (Gals)

Released To: Select

Released From: Select

Duration: (Minutes) **Reportable Quantity Exceeded:** ☐ Yes ☐ No

Clean Up Action: **Compliance Breach:** Select Type

Compliance Breach Comment:

Surface Area: ☐ Square Feet ☐ Square Meters

Environmental Impact:

How Release Was Discovered:

Number of Tanks: **Tank Size:** **Are Tanks Cathodically Protected:** ☐ yes ☐ no

Tank Construction: Select Type **Tank Walls:** Select Type **Piping Construction:** Select Type

Piping Wall: Select Type **Leak Detection:** Select Type

Environmental Event: (Fill out if there is and environmental event)

System Involved: Select Type **Equipment Involved:** Select Type

Regulatory Reference (If Known):

Reportable Event: ☐ Yes ☐ No **Reporting Actions and Rationale:**

Vehicle Incident: (Only fill out if there is a vehicle incident)

Vehicle Class: ☐ > 3 5 Tons Unloaded ☐ < 3.5 Tons Unloaded **Vehicle Type:** Select Type

License Plate Number: **Tractor Number:** **Trailer Number:**

Damage Description:

Product Transported: Select Type ☐ On Road ☐ Off Road

Road Type: SelectType **Accident Type:** Select Type **Emergency Response:** ☐ Yes ☐ No

Number of Vehicles Involved: **HAZMAT Being Transported:** ☐ Yes ☐ No

Vehicle 1 Operator: Select Type **Driver 1 Name:** **Total Years Driving:**

Professional Driver: ☐ Yes ☐ No **Driver 1 Statement:**

Vehicle 2 Operator: Select Type **Driver 2 Name:** **Total Years Driving:**

Professional Driver: ☐ Yes ☐ No **Driver 2 Statement:**

Third Party Details:

3rd Party Transport Incident: (Only fill out if there is a 3rd Party Transport Incident)

Complainant Name: **Complainant Phone Number:** **Complainant Address:**

Person Who Received Complaint: **Receivers Phone Number:**

Nature of Complaint: Select Type **Claimed Damage:**

Coincident Activity:

Investigation Team Sent: ☐ Yes ☐ No **Dispatched Date:** **Dispatched Time:**

Report Back Date: **Report Back Time:**

Investigation Team Members:

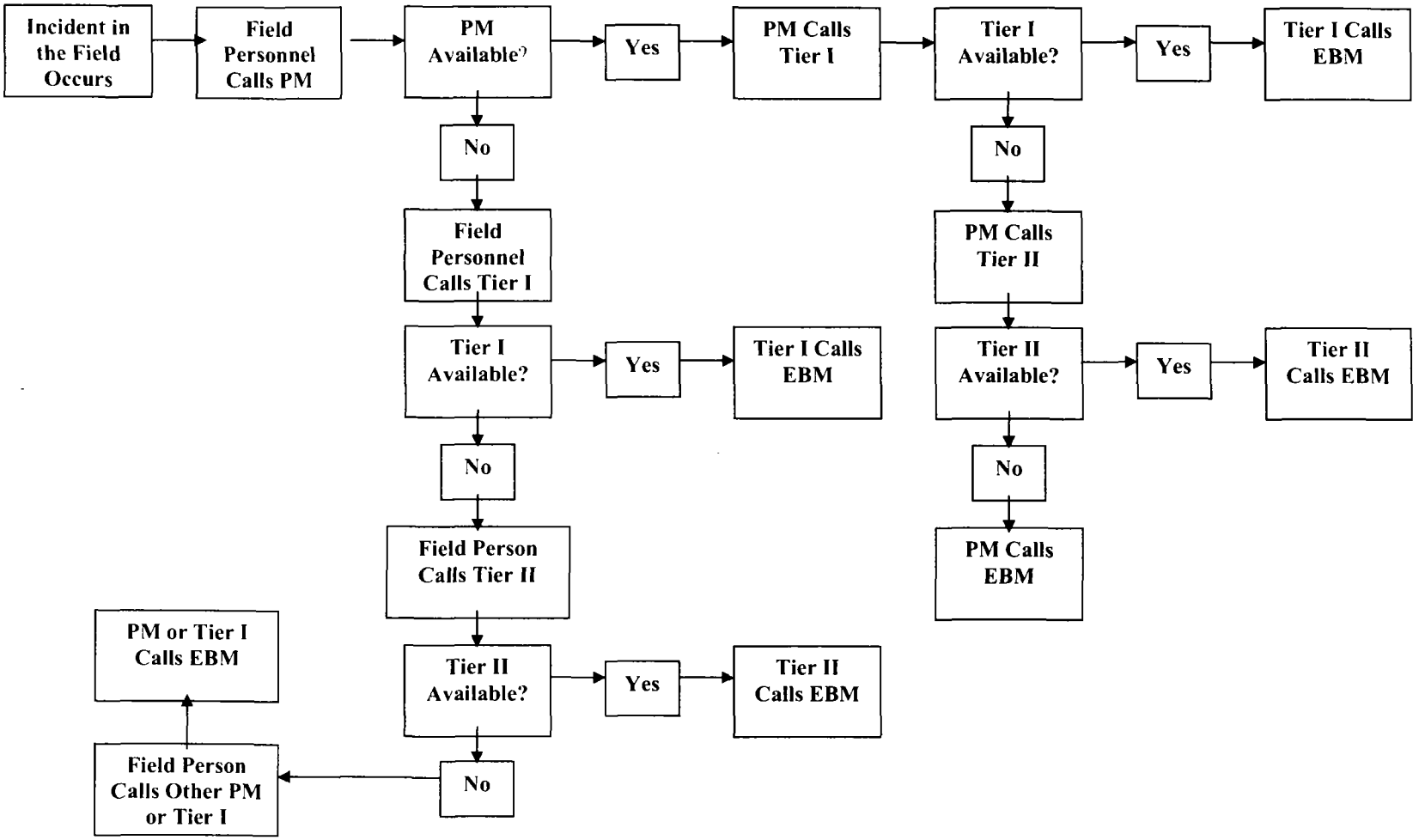
Investigation Team Comments:

Follow-up Contact: Select Type **Contact Name:** **Contact Date:**

Contact Comments:

Attachment 4

BP ARCO II/NMI NOTIFICATION FLOWCHART



BPACC01775

RM Environmental Manager
Site / Portfolio

Kyle Christie
OBC

Remediation Management Incident Reporting List

All incidents occurring on an RM project or site shall be reported according the HSSE Expectations found on www gemhse com
As a minimum, all injuries, spills greater than 1 barrel and all property damage greater than $500 should be reported to RM management **immediately**
Additionally, Notices of Violation and any incident which could be reported in the media should be reported immediately
Reporting must be done to a person and not via voice message, email or fax One must ensure contact is made
If you unable to contact the first contact on the list, then you should attempt to call the next person on the list
Please fill out the areas highlighted in yellow and return them to Ray Vose

Remediation Management Organization Notification					
Position	Person	Office	Cell Phone	Pager	Home
RM Environmental Manager	Kyle Christie	714-670-5303	714-815-8971	800-901-4668	
Back Up Environmental Manager	Darrell Fah	714-378-5105	714-473-9672	800-910-4906	714-9625165
West Region Manager	Mark Brekhus	714-228-6703	213-952-9215		310-546-1434
West Deputy Region Manager	Chris Winsor	714-670-5125	714-264-3202	800-970-8743	909-593-9321
RM Americas HSSE Manager	John Bennington	630-434-4102	630-660-6699	877-584-3506	630-305-3160
BP Naperville 24 Hour Notification Center		800-321-8642 or 312-856-2200			

Supplier Organization Notification					
Position & Area of Responsibility	Person	Office	Cell Phone	Pager	Home
Tier II/CA	Bob Wilson	805-546-0455 x22	805-441-6720		805-481-6287
Tier I/Central Portfolio	John Bollier	805-230-1266 x24	805-427-4952		805-527-9625
Principal In Charge	Philip Kinney	805-230-1266 x22	805-427-4953		
Senior Geologist	Gareth Roberts	805-230-1266 x240	805-427-4959		
Senior Engineer	Kushan Kuru	805-230-1266 x222	805-358-8175		
Project Specialist	StephAnnie Roberts	805-230-1266 x232	805-427-4873		
Associate Geologist	Randy Couture	805-230-1266 x280	805-427-4863		
Drafter	Tony Roman	805-230-1266 x235			

BPACC01776

BP Operations Notification*					
Company & Position	Person	Office	Cell Phone	Pager	Home
BP Crime Prevention	"On-Call" Attendant	800-411-4422	N/A	N/A	N/A
BP West Coast Mission Control	"On-Call" Attendant	800-ARCOFIX	N/A	N/A	N/A

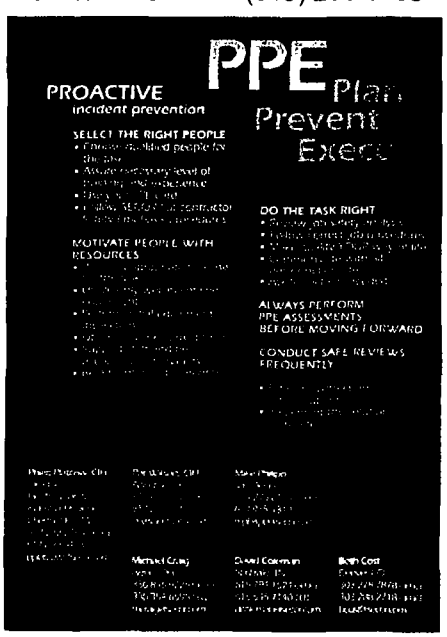
*The BP Operations Notification is to be used when GEM is operating on an active BP site such as Whiting Refinery

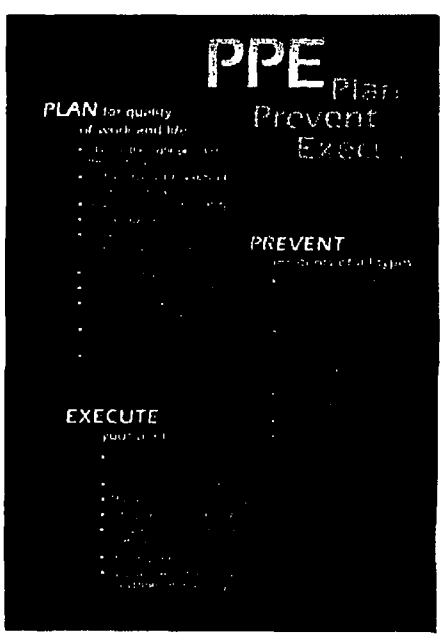
Other useful numbers for this portfolio					
Company & Position	Person	Office	Cell Phone	Pager	Home
BP GPA	Daniel M. Cummings	714-228-6719	714-615-4366		
Legal	Asteghik (A.K.) Khajetoorians	714-228-6772	818-807-8114		
Emergency Spill Response Contractor (Ancon)	Pete Esparza	310-548-8351			

BPACC01777

SECOR BP ARCO PROJECT MANAGER NOTIFICATION LIST

NAME	PHONE	MOBILE PHONE	EMAIL ADDRESS	POSITION
Bob Wilson	(805) 546-0455	(805) 441-6720	bwilson@secor.com	GEM West Tier II Manager
John Bollier	(805) 230-1266	(805) 427-4852	jbollier@secor.com	GEM West Tier I Manager
Marci Richards	(619) 296-6195	(619) 379-2206	mrichards@secor.com	GEM West Tier I Manager
		Central & East Portfolios		
Gareth Roberts	(805) 230-1266	(805) 427-4853	groberts@secor com	Project Manager
Tony Wong	(805) 546-0455	(805) 748-4411	twong@secor com	Project Manager
Philip Kinney	(805) 230-1266	(805) 427-4856	pkinney@secor com	Project Manager
Cleve Solomon	(805) 230-1266	(626) 253-4224	gsolomon@secor com	Project Manager
Andy Modugno	(805) 230-1266	(805) 402-7279	amodugno@secor.com	Project Manager
		San Diego/West LA Portfolio		
Carole Farr	(619) 296-6195	(619) 750-1324	cfarr@secor com	Project Manager
Kurt Myers	(619) 296-6195	(619) 865-8372	kmyers@secor com	Project Manager
Brad Eisenberg	(619) 296-6195	(619) 459-5914	beisenberg@secor com	Project Manager
Benjamin Eastman	(619) 296-6195	(619) 347-2827	beastman@secor com	Project Manager
Cathy Sanford	(714) 379-3366	(714) 585-0652	csanford@secor com	Project Manager
		RCOP California		
Wade Melton	(714) 379-3366	(714) 470-6429	wmelton@secor.com	Project Manager
Marci Richards	(619) 296-6195	(619) 379-2206	mrichards@secor com	Project Manager





ATTACHMENT 4
PRE-DRILLING/EXCAVATION CHECKLIST AND UTILITY CLEARANCE LOG

PROJECT:			
LOCATION		**DATE·**	
UTILITY LOCATOR·		**UTILITY LOCATOR PHONE #·**	
DATE OF LOCATOR REQUEST.		**LOCATOR CALL REFERENCE #.**	

Instructions This checklist is to be completed by SECOR personnel prior to initiation of field activities as a safety measure to insure that all underground utility lines, other underground structures and above-ground power lines are clearly marked in the area selected for boring or excavation **DRILLING OR EXCAVATION WORK MAY NOT PROCEED UNTIL** _____ **(fill in the name of the utility service) HAS BEEN CONTACTED AND THIS CHECKLIST HAS BEEN COMPLETED IF ANY OF THE QUESTIONS ANSWERED BELOW ARE ANSWERED "NO", THEN PROJECT MANAGER MUST BE CONTACTED AND CONCERNS/ISSUES DISCUSSED** Document the reason for a "NO" answer on the back of this form

Type of Utilities and Structures	**Not Present**	**Present**	**How Marked** (Flags, paint on pavement, wooden stakes, etc)
Petroleum product line			
Septic tank/drain field			
Other			

YES	NO	PRE-MOBILIZATION
		Is a scaled site plan, map or drawing showing the proposed borehole locations attached to this form?
		Does each borehole location allow for clear entry and exit, adequate workspace, and a clear path for raising the mast and operating the drill rig and all support equipment? Ensure 20 feet of clearance distance between the mast and electrical lines (SECOR H&S Policy and 29 CFR 1926 550) Check with the power utility company
		Are all of the proposed borehole locations and associated areas of pavement cutting at least 5 feet from any subsurface or above-ground utilities shown on client's building plans? SECOR PM check here . if plans not provided by client (therefore not applicable to this job)
		Are all of the proposed borehole locations and associated areas of pavement cutting at least 5 feet from any subsurface or above-ground utilities shown on public right-of-way street improvement or other public property plan or site map? PM check here if not applicable to this job
		Has the Site Representative, familiar with the site, such as a construction manager, indicated no knowledge of any subsurface or above-ground utilities within 10 feet of the proposed borehole locations? Is the Site Representative qualified to make such a determination?
		Are all of the proposed borehole locations and associated areas of pavement cutting at least 5 feet from any subsurface utilities identified during a geophysical survey? Applicable Yes / No
		Have all Utility Locating Service providers notified by the public line locator marked out their facilities in the vicinity of the borehole locations or otherwise notified us that they do not have any facilities near the proposed borehole locations?
		Are all proposed borehole locations and associated areas of pavement cutting at least 5 feet from a visual line connecting two similar looking manhole covers?
		Are all proposed borehole locations and associated areas of pavement cutting at least 5 feet from a visual line perpendicular to the street from the water, gas, and electrical meters?
		Are all proposed boring locations and associated areas of pavement cutting clear of pavement joints, curbs, crash posts, or other engineered structures?
		Does the pavement lack signs of previous excavation (e g no pavement subsidence, no differences in pavement texture or relief, no pavement patching)? If there are signs, determine the purpose of the previous excavation and act accordingly
		Before drilling have you hand dug/used a water jet VacTron unit/tile probe/etc , to dig a hole 5 feet below grade if possible, and is the diameter of the hole greater than the outer diameter of the drilling auger?
		Does the soil you encountered in the hand-dug hole appear to be native material (i e free of clean gravel, clean sand, aggregate base [gravelly sand with ~10% fines], or other non-native looking material)?
		Have you made sure that you have identified all the expected utilities or have made sure that you can explain any missing utilities?

Have the above concerns been discussed with the SECOR Project Manager? Yes / No
Have the above concerns been discussed with the client? Yes / No
Have you made a reasonable effort to resolve the above issues? Yes / No
Approval to proceed provided by Client Representative Name _____ Title and Date _____
Approval to proceed provided by SECOR Representative Name _____ Title and Date _____
SECOR Field Technician Name _____ Title and Date _____

ATTACHMENT 5a

EQUIPMENT CALIBRATION/CHECK LOG

DATE	INSTRUMENT/ MODEL NO.	SERIAL NO.	BATTERY CHECK OK?	ZERO ADJUST OK?	CALIBRATION GAS (PPM)	READING (PPM)	LEAK CHECK	PERFORMED BY	COMMENTS

* Submit copies of logs to Director of Industrial Hygiene & Health and Safety, Philip A. Platcow, CIH within 24 hours, if a PEL is exceeded, or personal protective equipment level is upgraded at (617) 232-7355 or via email at pplatcow@secor.com

ATTACHMENT 5b

MONITORING LOG

Instrument(s) Used Make _____ Model: _____

DATE	TIME	LOCATION/SOURCE (*Personal/Area* Sampling)	WORK ACTIVITY DURING SAMPLING (Be specific)	Measurement (Units)	WHAT DID YOU DO BECAUSE OF THE RESULT? (PPE Change/Activity Change/Nothing Needed)	SAMPLED BY

* Submit copies of logs to Director of Industrial Hygiene & Health and Safety, Philip A. Platcow, CIH within 24 hours, if a PEL is exceeded, or personal protective equipment level is upgraded at (617) 232-7355 or via email at pplatcow@secor com

ATTACHMENT 5b

MONITORING LOG

Instrument(s) Used Make _____ Model _____

DATE	TIME	LOCATION/SOURCE (Personal/Area Sampling)	WORK ACTIVITY DURING SAMPLING (Be specific)	Measurement (Units)	WHAT DID YOU DO BECAUSE OF THE RESULT? (PPE Change/Activity Change/Nothing Needed)	SAMPLED BY

* Submit copies of logs to Director of Industrial Hygiene & Health and Safety, Philip A. Platcow, CIH within 24 hours, if a PEL is exceeded, or personal protective equipment level is upgraded at (617) 232-7355 or via email at pplatcow@secor.com

ATTACHMENT 6

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date:	
Start Time:	
Issues Discussed:	
1.	**6.**
2.	**7.**
3.	**8.**
4.	**9.**
5.	**10.**
Attendees	
Print Name and Company	**Signature**
Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

ATTACHMENT 6

DAILY PRODUCTION HEALTH AND SAFETY BRIEFING LOG

Date:	
Start Time:	
Issues Discussed:	
1.	**6.**
2.	**7.**
3.	**8.**
4.	**9.**
5.	**10.**
Attendees	
Print Name and Company	**Signature**
Meeting Conducted by:	**Signature:**
Name (Site Health and Safety Coordinator):	**Signature:**

DISCUSSION IDEAS FOR THE DAILY PRODUCTION H&S MEETING

- ☐ Emergency response plan, emergency vehicle (full of fuel) and muster point
- ☐ Route to medical aid (hospital or other facility)
- ☐ Work hours, is night work planned?
- ☐ Hand signals around heavy equipment
- ☐ Traffic control
- ☐ Pertinent Legislation and Regulations
- ☐ Above and below ground utilities (energized or de-energized)
- ☐ Material Safety Data Sheets (MSDS)
- ☐ To who, what, why, and when to report an incident
- ☐ Fire extinguisher and first aid kit locations
- ☐ Excavations, trenching sloping and shoring
- ☐ Personal protective equipment (PPE) and training
- ☐ Safety equipment and training
- ☐ Emergency telephone and telephone numbers (may not be 911)
- ☐ Eye wash stations and washroom locations
- ☐ Energy lock-out/tag-out procedures Location of "kill Switches" etc.
- ☐ Weather restrictions
- ☐ Site security. Site hazards Is special waste present
- ☐ Traffic and people movements
- ☐ Working around machinery (both static and mobile)
- ☐ Sources of ignition, static electricity etc
- ☐ Stings, bites, large animals and other naturally related injuries
- ☐ Working above grade
- ☐ Working at isolated sites
- ☐ Decontamination procedures (both personnel and equipment)
- ☐ Falls, trips, sprains and lifting injuries (how to prevent)
- ☐ Right to refuse unsafe work
- ☐ Adjacent property issues (residence, business, school, day care center)

ATTACHMENT 7

HEALTH AND SAFETY PLAN ACKNOWLEDGMENT AND AGREEMENT FORM

(All SECOR and subcontractor personnel must sign.)

"GOAL: Zero Incidents of ANY Kind. Work Together to Assess Hazards and Ensure A SAFE and High Quality Project"

This Health and Safety Plan has been developed for the purpose of informing SECOR employees of the hazards they are likely to encounter on the project site, and the precautions they should take to avoid those hazards. Sub-contractors and other contractors at the site must develop their own Health and Safety Plan to address the hazards faced by their own employees SECOR has provided a copy of this Plan to contractors in the interest of full disclosure of hazards of which we may be aware, and to satisfy SECOR's responsibilities under the Occupational Safety and Health Administration (OSHA) Hazard Communication standard. Similarly, contractors are required to inform SECOR of any hazards of which they are aware or that the contractor's work on site might possibly pose to SECOR employees, including (but not limited to) the Material Safety Data Sheets for chemicals the contractor may bring on-site This plan should NOT be understood by contractors to provide information on all of the hazards to which a contractor's employees may be exposed as a result of their work.

I further certify that I have received training and medical surveillance according to the Health and Safety Plan and the OSHA Standard on Hazardous Waste Operations and Emergency Response (29 CFR 1910.120):

All parties conducting site activities are required to coordinate their activities and practices with the project Site Health and Safety Officer Your signature below confirms that you have read and understand the hazards discussed in this Plan, and understand that sub-contractors and contractors must develop their own Health and Safety Plan for their employees. You also understand you could be prohibited by the Site Health and Safety Officer or other SECOR personnel from working on this project for not complying with any aspect of this Health and Safety Plan

Name	Title	Signature	Company	Date

Name	Title	Signature	Company	Date

Group Environmental Management Company

Attachment 8

PRECAUTIONARY PROCEDURES AND GUIDELINES DOCUMENT FOR DRILLING, SUBSURFACE INVESTIGATIONS AND REMEDIAL CONSTRUCTION ACTIVITIES FOR GEM MARKETING OPERATIONS

1.0 Objective

The objective of this document is to provide standard practices and procedures to avoid and/or eliminate the potential of encountering, puncturing, compromising or disrupting service to buried on-site utility service lines, municipal or third party owned off-site utility services, UST system components and other subsurface property service lines or systems (e.g., septic leach fields, etc.) during intrusive activities performed on behalf of GEM Marketing. These standard practices and procedures are precautionary measures *recommended* for all drilling and subsurface investigation work including soil sampling, geoprobe sampling, ground water sampling, well installation and any other intrusive or construction activities performed for environmental work conducted at BP, BP–divested and third party properties where BP may have an interest (e.g., acquisition properties) Where applicable, the governing regulatory agency requirements shall supersede

Although presented as recommendations, it is fully expected that the Primary Contractor is responsible for implementation of these guidelines and procedures at all GEM Marketing investigation sites Deviations from these guidelines and procedures on a site-specific basis will require communication and agreement between the BP Environmental Business Manager (EBM) and the Primary Contractor Project Manager during the pre-investigation planning period. Should regional conditions exist that warrant alternative precautionary procedures, alternative methods shall be clearly communicated between the BP EBM and the Primary Contractor; however, the implementation of the alternative methodologies will require approval from the Regional Area Manager Additionally, a written description of the alternative procedure shall be included as an addendum to the drilling and procedures guidelines and submitted to the GEM Prevention Team for posting in the Prevention Toolbox as a best practice and to capture shared learning's.

2.0 Pre- Investigation Planning

Prior to the advancement of any intrusive data collection or excavation activities, the Primary Contractor is responsible for non-intrusive investigative and property inspection activities to determine the location(s) for intrusive data collection, taking into consideration potential for encountering underground utilities, UST system components and other underground human-made structures as well as meeting regulatory compliance sampling requirements The Primary Contractor shall also have regional subsurface knowledge of general soil conditions that may be encountered in the area to distinguish between native soils and fill materials that may be indicative of utility trenches, UST system trenches and backfill materials, etc

2.1 Facility and Third Party Work Notification

The Primary Contractor is responsible for contacting the appropriate facility personnel in advance prior to the startup of the work For third party or divested properties, the Primary Contractor is responsible for making all appropriate site notifications in accordance with the terms and conditions of the access agreement (s) entered into between BP and the third party. The Primary Contractor MUST also notify the BP Environmental Business Manager prior to beginning any field activities. The Primary Contractor shall be responsible for meeting all regulatory and utility locating notification requirements

2.1.1 Third Party Investigations

The Primary Contractor is responsible for providing oversight during all 3rd Party intrusive investigations. The 3rd Party shall submit for review and approval all boring locations and agree to implement BP's precautionary drilling techniques. No soil boring or investigation point shall be installed within 10 feet of any UST system component

2.2 Soil Boring, Well Placement and Subsurface Excavation Considerations
The BP Environmental Business Manager and the Primary Contractor project manager, prior to the commencement of drilling, must agree on *High Risk (e g , near UST system Components, off-site utility corridors, etc.)* locations of soil borings, wells, sampling points, and other excavation or construction activities, unless otherwise specified in the site-specific project scope Traffic control devices must be utilized to secure work area when performing intrusive work or investigations. No soil boring or investigation point shall be installed within 10 feet of any UST system component. The Primary Contractor is responsible for having a contingency plan in effect when drilling or excavating in a *High Risk* area that will include prior station notification and planning, dispenser shutdown, etc

Note It is highly desirable that off-site delineation soil borings/monitoring wells NOT be installed in public right-of-ways, streets, and highways or near municipal or third party owned utility corridors It is the Primary Contractor's responsibility to evaluate all alternative off-site drilling locations and risks associated with these off-site locations including regulatory requirements. The Primary Contractor must receive authorization and soil boring/monitoring well location approval from the BP EBM prior to installing any off-site soil boring/monitoring well at these locations BP recognizes that in some circumstances it will be necessary to investigate these areas, such as public streets, utility corridors and right of ways along public and private property boundaries.

2.3 Property, Utility Clearance and Pre-Investigation Checklist
The Primary Contractor is responsible for all property, utility clearances and confirming all necessary access agreements have been secured prior to the start of work. Additionally, the Primary Contractor is responsible for identifying and obtaining all local government and governing regulatory agency permits, right-of-way and all underground line and utility clearances. The following property and utility clearance procedures and attached Pre-Investigation Checklist will be completed by the Primary Contractor prior to the start of work:

- The Primary Contractor project manager is responsible for notifying of all applicable persons of the work and the proposed schedule (e.g., property owner and/or tenant, BP facility manager and/or maintenance supervisors).
- The Primary Contractor is responsible for obtaining and reviewing all available sources for site plans. These may include BP as-built plans, historical and current typical UST system layouts, contractor files, and county and city files (e.g. utility drawings). Additionally, construction diagrams and plans will be requested from owners, tenants and developers of former BP properties
- Public utility mark-outs will be performed and the Pre-Investigation Preliminary Checklist (attached) will be completed for all Intrusive Fieldwork and retained in the project file A copy of the Pre-Investigation Preliminary Checklist will be attached to the site-specific Health and Safety Plan and accompany field personnel during site investigation activities The State-specific Utility Notification services will be contacted to request utility mark-outs A comprehensive list of state-specific Utility Notification services is attached; however, the list is intended for reference only and the supplier is responsible for verifying the appropriate service for each work location Additionally, all utility companies not participating in the state-specific Utility Notification service will be contacted for utility information. BP recommends the Primary Contractor utilizes a private on-site utility locating company or equivalent at all properties BP encourages and prefers each Primary Contractor to obtain equipment and training to perform the on-site utility mark-outs in house by properly trained technicians familiar with intrusive investigations at retail facilities (Regional preference may be adopted) Additionally, Primary Contractors will identify and actively participate in any proactive partnerships, groups or counsels designed to prevent damage to utilities (e g , "The Utilities Council of Northern Ohio")

- **Pre Investigation Site Walk Over (Operating Service Station Facilities):** A Predrilling site walkover will be performed by an experienced Primary Contractor personnel with a maintenance representative and/or BP station employee who has inherent knowledge of the site when possible, taking into account all physical features of the site, including utility mark-outs and proposed boring locations Prior to the Predrilling site walkover, Primary Contractor will request that a station representative familiar with the UST

system and historical upgrades be available. Primary Contractor will visually locate all utility service line(s) entry points to the station building and evaluate potential utility trench locations with respect to municipal mains and services. Primary Contractor will review location of all emergency UST system shutoff switches w/station representatives. On-site utility service line data will be hand sketched on a site diagram, retained by the Primary Contractor and made available upon request.

- **Pre Investigation Site Walk Over (Divested/Redeveloped Service Station Facilities):** A Predrilling site walkover will be performed by an experience Primary Contractor personnel with a property owner/tenant representative who has historical knowledge of the site when possible, taking into account all physical features of the site, including utility mark-outs and proposed boring locations. Prior to the Predrilling site walkover, Primary Contractor will request that a property owner/tenant representative familiar with any post sale development activities be available for the walkover Primary Contractor will be responsible for visually locating all utility service lines entry points to the station building and evaluate potential utility trench locations with respect to municipal mains and services. On-site utility service line data will be hand sketched on a site diagram, retained by the supplier and made available upon request.

- If it is determined during the site walkover that the proposed work may be in close proximity to a subsurface utility or other hazard(s), the Primary Contractor will re-evaluate the necessity of the boring The Primary Contractor will communicate liability versus necessity of data collection whenever potential exists for a possible drilling incident to occur. If revised sampling or excavation locations are required, the Primary Contractor will review the modified locations with the BP EBM.

- Any contact with a subsurface utility will be immediately communicated to BP EBM (and BP station personnel as conditions warrant) and all appropriate incident reporting procedures shall be initiated. If contact with a utility results in a release and/or hazardous or unsafe conditions, appropriate emergency authorities will be contacted Refer to site Health & Plan for appropriate HSE and emergency response communications and procedures. Additionally, all applicable BP HSE and Emergency Response communications and responses shall be initiated

3.0 Drilling/Sampling Technology and Considerations

The following Drilling and Sampling Technology Considerations will be adhered to all Sites

All drilling is recommended to occur a minimum of 10 feet from any known or suspected location of an underground structure or utility to ensure the integrity of these structures are not compromised Unless required for corrective action (e g recovery of free product; for regulatory compliance and/or as otherwise necessary to maintain operational integrity e g investigation of a suspected release)

Special operating procedures must be followed when drilling within the recommended 10 feet exclusion zone Such procedures include specific approval of the BP EBM and could include having a Retail Maintenance technician on-site, shut down of product pumps and/or power, and use of specialized clearance or drilling techniques (e g vacuum drilling).

All boreholes and sampling points will be advanced utilizing a precautionary drilling technique (e g a hand auger, posthole digger, air knife, pressurized water knife and/or high vacuum extraction, etc) through the initial five-(5) feet of the subsurface to minimize impacts to unknown or abandoned buried utilities The selected drilling technique must account for exploring all subsurface soils through the initial five feet of advancement at a minimum diameter greater than the maximum **operating diameter** of the auger flights, well casing or sampling points that will be required to complete the sampling point The Primary Contractor shall utilize best professional judgment and select the best *available technology to minimize the risk of encountering underground utilities based on site soil conditions*, regulatory sampling requirements, cost effectiveness and scope of work Additionally, the Primary Contractor will recognize that it may be necessary to extend the five feet precautionary drilling technique based on information (e g., municipal utility maps depicting utility mains constructed at a depth greater than five feet) collected during the planning phases of the investigation. The Primary Contractor will communicate and advise the BP EBM where such

additional precautions are warranted. Regardless of the precautionary drilling techniques selected, Primary Contractor shall have the responsibility for satisfying state specific regulatory compliance sampling requirements.

As previously indicated, it is highly desirable that off-site delineation soil borings/monitoring wells NOT be installed in public right-of-ways, streets, highways or near municipal or third party owned utility corridors. However, in those circumstances that require installation of borings/wells in these high-risk areas where utility mains may be present, the supplier will request that utility owner representatives be present during installation of the intrusive borings. No soil borings/wells will be installed in these areas without prior approval of the BP Environmental Business Manager

Primary Contractor field personnel will immediately notify the Primary Contractor project manager when unexpected soil or fill conditions (e g , pea gravel) are encountered that may indicate the presence of buried utility or product lines The Primary Contractor project manager will evaluate the field conditions with the field personnel and determine an appropriate course of action (e.g., terminate and offset, proceed, etc.). The Primary Contractor Project Manager is encouraged to consult with the BP Environmental Business Manager, when field conditions are uncertain If the BP Environmental Business Manager is unavailable, the Primary Contractor is encouraged to proceed on the side of caution (i.e., stop work or terminate sampling point and select an alternative location that will satisfy the work scope).

4.0 Health and Safety Requirements

The Primary Contractor is responsible for ensuring that a Health and Safety Plan (HASP) is prepared in accordance with all OSHA and other applicable Federal, State and local regulations for each site. The terms of this HASP must be clearly communicated and formally agreed to by all personnel involved in performance of the work. The HASP must remain on site at a clearly identified, easily accessible location until the project is completed. The HASP shall remain in the consultant's permanent project file. BP Terminal, Distribution and Process facilities may have additional health and safety requirements. Additional site-specific requirements must be discussed in advance with the BP EBM, preferably during project scope development. The Primary Contractor is responsible for ensuring all required traffic control is provided and
Strictly adhered to. Note: Predrilling checklist shall be included in the Site Specific Health and Safety Plan.

A BP affiliated company

State utility locating service directory

AL	Alabama Line Location Center	800-292-8525		OR	Douglas Utilities Coordinating Council	503-673-6676	
AK	Locate Call Center of Alaska, Inc	907-278-3121		OR	Josephine Utilities Coordinating		
AZ	Arizona Blue Stake, Inc	602-263-1100	602-279-5342		Council	503-476-6676	503-476-4527
AZ	Arizona Blue Stake Center	800-782-2211	602-263-1100	OR	Rogue Basin Utility Coordinating		
CA	Underground Service Alert North	800-442-4133	510-798-1683	OR	Malheur Utility Coordinating Council	503-889-2468	
CA	Underground Service Alert South	800-442-4133	714-528-3423	OR	Utilities Notification Center	503-246-6699	503-293-0826
CO	Utility Notification Center of Colorado	800-922-1987	303-234-1712	PA	Pennsylvania One Call System, Inc	800-242-1776	412-464-7104
CT	Call Before You Dig	800-922-4455	203-248-6448	RI	Dig Safe - Road Island	800-225-4977	617-273-2811
DE	Miss Utility of Delmarva	800-282-8555		SC	Palmetto Utility Protection Service, Inc	800-922-0983	
FL	Call Sunshine	800-432-4770	305-720-5918	TN	Tennessee One-Call System	800-351-1111	615-366-5021
GA	Utilities Protection Center, Inc	800-282-7411	404-623-4566	TX	Texas One-Call System	800-245-4545	214-323-7170
ID	Palouse Empire Underground			TX	Austin Area Utility Coordinating		
	Coordinating Council	800-822-1974	208-882-2031		Council	512-472-2822	512-499-7329
ID	Utilities Underground Protection Center	800-424-5555	206-451-2385	TX	Texas Excavation Safety System	800-344-8377	214-690-1291
ID	Dig Line	800-342-1585	208-342-8907	TX	Lone Star Notification Center	713-223-4567	713-432-0998
ID	One Call Concepts	800-626-4950	316-687-3753	UT	Blue Stakes Location Center	800-662-4111	801-487-7410
IL	Julie, Inc	800-892-0123	815-741-5958	VT	Dig Safe – Vermont	800-225-4977	617-273-2811
IL	Digger	312-744-7000	312-744-4627	VA	Miss Utility of Virginia	800-552-7001	804-530-2179
IN	Indiana Underground Plant Protection			VA	Miss Utility	800-257-7777	
	Services	800-382-5544	317-849-2176	VA	Miss Utility of Delmarva	800-282-8555	
IA	Underground Plant Protection Service	800-292-8989		WA	Utilities Underground Location Center	800-454-5555	206-451-2385
KS	Kansas One-Call Center	800-DIG-SAFE	316-687-3753	WA	Grays Harbor & Pacific County Utility		
KY	Kentucky Underground Protection, Inc	800-752-6007	502-266-5743		Coordinating Council	206-532-3550	206-533-7659
LA	Louisiana One Call System, Inc	800-272-3020	504-769-9171	WA	Utilities Council of Cowlitz County	206-425-2506	206-636-0073
ME	Dig Safe-Maine	800-225-4977	617-273-2811	WA	Chelan-Douglas Utilities Coordinating		
MD	Miss Utility	800-257-7777			Council	509-663-6111	509-663-1719
MD	Miss Utility of Delmarva	800-282-8555		WA	Upper Yakima County Underground		
MA	Dig Safe-Massachusetts	888-344-7233	781-273-2811		Utilities Council	509-248-0202	
MI	Miss Dig Utility Communication			WA	Inland Empire Utility Coordinating		
	System	800-482-7171	810-332-7523		Council	509-456-8000	509-624-0220
MN	Gopher State One Call	800-252-1166	612-454-0170	WA	Palouse Empire Underground		
MS	Mississippi One Call System, Inc	800-227-6477	601-362-7533		Coordinating Council	800-822-1974	509-883-8487
MO	Missouri One Call System, Inc	800-344-7483	314-635-8402	WA	Utilities Notification Center	206-696-4848	503-293-0826
MT	Utilities Underground Protection Center	800-424-5555	206-451-2385	WV	Miss Utility of West Virginia, Inc	800-245-4848	304-345-3959
NE	Nebraska Underground Hotline, Inc	800-642-8434	402-331-3857	WI	Diggers Hotline, Inc	800-982-0299	414-259-1453
NE	Diggers Hotline	800-331-5666		WY	Wyoming One-Call	800-348-1030	316-687-3753
NV	Underground Service Alert North	800-227-2600	510-798-1683	WY	West Park Utility Coordinating Council	307-587-4800	
NH	Dig Safe - New Hampshire	800-225-4977	617-273-2811	WY	Call-In Dig-In Safe Commission	307-682-9811	307-682-4396
NJ	Garden State Underground Plant			WY	Fremont County Utility Coordinating		
	Location Service	800-272-1000	908-232-1930		Council	307-856-7555	
NM	New Mexico One Call System, Inc	505-260-1990	505-260-0968	WY	Central Wyoming Utilities		
NY	Underground Facilities Protective				Coordinating Council	307-265-5252	
	Organization	800-962-7962	315-437-2621	WY	Sweetwater County One-Call	307-362-8888	
NY	Utility Call Center c o Lilco Facilities	516-661-6000	516-677-4739	WY	Underground Utility Coordinating		
NY	NY City - Long Island One Call Center	800-272-4480	718-631-8395		Council	307-324-6666	
NC	The North Carolina One Call Center	800-632-4949	919-299-1914	WY	Albany County Utility Coordinating		
ND	Utilities Underground Location Center	800-454-5555	206-451-2385		Council	307-742-3615	
OH	Ohio Utilities Protection Service	800-362-2764	216-759-2745	WY	Southeast Wyoming Utilities		
OK	Call Okie	800-522-6543	405-848-9325		Coordinating Council	307-638-6666	
OR	Utilities Underground Location Center	800-454-5555	206-451-2385	WY	Utilities Underground Location Center	800-454-5555	206-451-2385
				DC	Miss Utility	800-257-7777	

ATTACHMENT 9

PRE-DRILLING/SUBSURFACE CHECKLIST FOR INTRUSIVE FIELDWORK

Site Name: _____ Job Number: _____

Site Phone Number:

_____ _____

Site Address: County:

_____ _____

Phone:

BP EBM: _____ _____

By

BP Site Mgr Contacted On _____ _____

As-Build: ☐ YES ☐ NO ☐ N/A Historical Drawings: ☐ YES ☐ NO ☐ N/A

As build drawings: ☐ YES ☐ NO

Third Party Construction/Redevelopment Plans: ☐ YES ☐ NO ☐ N/A

****(ATTACH SITE FIGURE WITH PROPOSED BORING/EXCAVATION LOCATION)****

Subcontractors (drillers, concrete, etc) Company Name:_____

Subcontractors Contact Person: _____ Phone:_____

Time: _____

1) Health and Safety Form Completed: ☐ YES ☐ NO Date: _____

2) Mandatory Utility Protection Services Minimum 48 Hrs. Advance Notice (State Specific Notification Period Supercedes)

Called: Date: _____ Time: _____ Initials: _____

Ref #: _____ Proposed Drilling Locations Pre-marked for Service: ☐ YES ☐ N/O

3) Mandatory Private or In-House Utility Locating Service Performed?

Called: Date: _____ Time: _____ Initials: _____

Name of Locating Service: _____

Telephone Number:_____ Contact Name: _____

Supplier Locating Technician: _____

Type of Sensing Equipment Used: _____

Proposed Drilling Locations Pre-marked: ☐ YES ☐ N/O

4) Other Potential Underground Structures

Name of City Engineer/Utility Representative: _____

Date Notified: _____ Maps: ☐ YES ☐ NO Cleared: ☐ YES ☐ NO

5) Completed Site Walkover with Site Manager/Designee or Owner/Tenant Rep. ☐ YES ☐ NO

Name of Site Manager: _____

Name of Property Owner/Tenant Representative: _____

Cleared: ☐ YES ☐ NO Building Utility Service Line Connections Identified: ☐ YES ☐ NO

Utility Service Line Points of Entry to the Property from Utility Mains Identified: ☐ YES ☐ NO

Hand sketch on site map w/proposed boring locations and most likely utility trench locations:

☐ YES ☐ NO

6) Utility Inventory:

Above Ground Services

Utility	Name	Depth (ft)	Phone	Notified	Date	Marked
Electric				☐ Y ☐		☐ Y ☐
Telephone				☐ Y ☐		☐ Y ☐
Cable				☐ Y ☐		☐ Y ☐
Overhead supports				☐ Y ☐		☐ Y ☐
Traffic Light				☐ Y ☐		☐ Y ☐

Below Ground Services

Electric				☐ Y ☐ N		☐ Y ☐ N
Telephone				☐ Y ☐ N		☐ Y ☐ N
Cable				☐ Y ☐ N		☐ Y ☐ N
Gas				☐ Y ☐ N		☐ Y ☐ N
Water				☐ Y ☐ N		☐ Y ☐ N
UST System				☐ Y ☐ N		☐ Y ☐ N
Storm Drain				☐ Y ☐ N		☐ Y ☐ N
Sanitary				☐ Y ☐ N		☐ Y ☐ N
Steam				☐ Y ☐ N		☐ Y ☐ N
Pipeline				☐ Y ☐ N		☐ Y ☐ N

Other

				☐ Y ☐ N		☐ Y ☐ N
				☐ Y ☐ N		☐ Y ☐ N
				☐ Y ☐ N		☐ Y ☐ N

7) Site-Specific Emergency Contingency Plan Incorporated in Health & Safety Plan: ☐ YES ☐ NO

8) Signature of Supplier Project Mgr. (required to begin fieldwork): _____

High Risk Drilling Locations Approved by EBM: ☐ YES ☐ NO Date: _____ Initials: _____

(Predrilling Checklist and supporting information to be included with the site H&S Plan, present on-site during

all intrusive investigations and available on request)

Name of Project Manager (Printed or Typed)	**Signature of Project Manager**
Name of Supplier Field Personnel	**Signature of Supplier Field Personnel**

NOTE: Primary Contractor Signature is verification that Field Personnel have reviewed, adhered to and received the necessary supplier training to implement precautionary drilling standards for performing work at GEM Marketing Retail properties as defined in BP's PRECAUTIONARY PROCEDURES AND GUIDELINES FOR DRILLING, SUBSURFACE INVESTIGATIONS AND REMEDIAL CONSTRUCTION ACTIVITIES. Any questions or concerns should be elevated to the Primary Contractor Project Manager or EBM prior to initiating fieldwork.

ADDITIONAL COMMENTS / NOTES:

ATTACHMENT 10

EMPLOYEE CERTIFICATION INFORMATION

See section 10.0 for personnel working on-site. Any additional personnel will be added as needed

ATTACHMENT 11

I. PURPOSE & SCOPE OF PLAN

The Site Emergency Response Plan provides the on-site user with critical information to be used in the event of an emergency for a RETAIL SITE Type situation For operating facilities, including active BP retail and terminal facilities, also refer to the Facility Response Plan

IN AN EMERGENCY (e.g , fire, major injury, crime, major release) CALL 911 FIRST (if Available or the alternate number) and NOTIFY the ON SITE OPERATOR

II. NOTIFICATION GUIDELINES

EMERGENCY CONTACTS-Keep calling in the order below until you speak to someone LIVE:

		PHONE NUMBER (provide area codes)	
Consultant	**Name or Description**	**Work**	**24-hr. Contact**
Project Manager:	**Philip Kinney**	**805-230-1266 x224**	**805-427-4856**
National Accounts Manager:	**Bob Wilson**	**(805) 546-0455**	**(805) 441-6720**
Director of IH/H & S:	**Philip Platcow, CIH**	**(617) 232-7355**	**(617) 899-5403**
BP Environmental Business Mgr.:	**Kyle Christie**	**714670-5303**	**714-815-8971 cell 800-901-4668 pgr**
Deputy Regional Manager:	**Chris Winsor**	**(714) 670-5125**	**(714) 264-3202**
Regional Manager:	**Mark Brekhus**	**(714) 228-6703**	**(213) 952-9215**
Americas HSSE Manager:	**John Bennington**	**(630) 836.7103**	**(630) 660-6699**
EMERGENCIES ONLY BP Notification Center		**(800) 321-8642**	**(800) 321-8642**

Hospital Route\Area Map Found on Page 6 of completed Site Health and Safety Plan with highlighted route to nearest hospital.

Traffic Guide\Site Map Refer to the Site Specific Traffic Guidance and Control Plan (drawing) attached in the back of the HASP in Attachment 2

III. EXTERNAL CONTACTS / EMERGENCY INFORMATION:

LOCAL EMERGENCY TELEPHONE NUMBERS (provide area code): CALL 911 FIRST if needed!!

Since cellular telephones may not reach a local 911 operator, also supply the following information.

Ambulance	**310-219-0611**	**Fire Department**	**310-217-7066**
Hospital ER	**310-538-6629**	**Police Department**	**310-217-9601**
Poison Control Center	**(800) 876-4766**	**HazMat Response Unit**	**(800) 272-6349**

IV. EMERGENCY ROUTES:

Hospital Name:	**Memorial Hospital of Gardena**	**Phone number:**	
Hospital Address:	**1145 W. Redondo Beach Blvd., Gardena, CA 90247**		
Hotel for Operations Center:	**Nearest Hotel Name\phone:**		

V. EVACUATION PROCEDURES:

EMERGENCY MEETING SITE Determined by the SHSO and discussed during the Daily Production Safety

	Meeting
EVACUATION ROUTES/PROCEDURES	When the order/alarm is given/sounded, all personnel will proceed to the designated gathering location where one person will hold a muster to determine if all have safely egresses from the site

VI. INCIDENT MANAGEMENT TEAM & ORGANIZATIONAL CHART

BP EBM or the Consultant will have a copy of the BP America's Response Guide

VII. INCIDENT MANAGEMENT TEAM DESCRIPTIONS -- AND HOW TO ACTIVATE THE TEAM

BP EBM or the Consultant will have a copy of the BP America's Response Guide.

VIII. EMERGENCY OPERATIONS CENTER

Locate at local Hotel – See V. Local Resources

IX. LINKED PLANS: BP: BUSINESS SUPPORT PLAN – RM WEBSITE.

http://gem bpweb bp com/gem/default asp?content=64

For active BP facilities also refer to the site specific Facility Response Plan:

Contact Name: _____, Title: _____
Location of Plan: _____

X. PLAN MAINTENANCE

Schedule --- Updated annually or more frequently as information changes.
Contact name --- Project Manager is responsible for the update of this plan.

ATTACHMENT 12
SUBCONTRACTOR'S HEALTH AND SAFETY PLAN

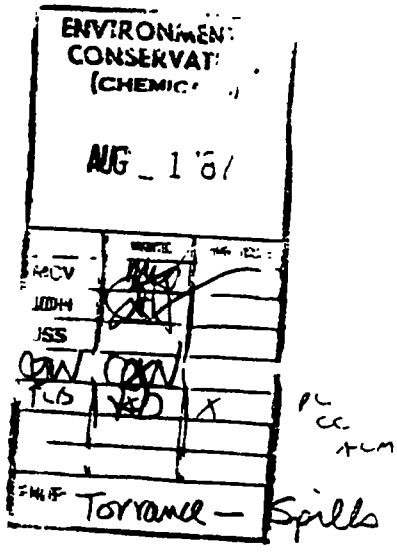
(Instructions to Project Manager and Subcontractor: Please ensure that all subcontractors provide their own site-specific HASP for their portion of the work This should be attached behind this page so that it blends smoothly with the SECOR portion of the HASP. The subcontractor's HASP must be site-specific and discuss all of the hazards to which their employees may be exposed, and the appropriate means they will follow to avoid the exposure to the extent possible SECOR's HASP can be used as a guide for developing the subcontractor's HASP, but cannot be used exclusively since the subcontractor's employees may face exposures and risks not covered by the SECOR HASP

Subcontractors must understand that our team goal is zero incidents of all types If the subcontractor has any questions, he/she may contact Philip Platcow, SECOR's Director of Health and Safety at (617) 232-7355 for guidance and direction. Cooperation on this requirement is greatly appreciated)

ATTACHMENT 13

MATERIAL SAFETY DATA SHEETS

Amoco Chemicals Company



C. F. Kirby

Joliet

Torrance Plant Monomer Spill

At approximately 11:00 A.M. on 8/12/87, 205 gallons of styrene were dumped on the ground at the Torrance plant. This was 1,544 pounds at 74° F. The mixer operator accidently opened a wrong valve sending styrene to the small dissolver tank (1,200 gallons) instead of one of the larger mix tanks (12,500 gallon capacity). The small tank overflowed from the vent and loading door. The amount of 205 gallons was exact, taken from the difference between the meter reading and the amount of monomer left in the dissolver tank.

The tank is located in one corner of the tank farm and the transfer pump pressure forced some styrene, through the vent, out of the tank farm diked area onto the plant asphalt. The rest of the spill stayed in the diked area.

Clean up operations started immediately. Sand was spread over the asphalt to absorb the styrene there. The styrene in the tank farm stayed in pockets on the ground, which is so hard that very little styrene was absorbed into the surface. The pockets were deepened into small reservoirs and the styrene bucketed out of them. About 130 gallons or 980 pounds were recovered and put in drums. The bulk of the remaining spill was absorbed into the sand on the asphalt yard. This sand was then put into fiber containers with lids.

The California Office of Emergency Services was notified by 1:00 P.M. and given the details of the spill. The District 1 State Division of Oil and Gas was also called to see if it was necessary to report to them.

It was not. C. J. Wierdak, Amoco Environmental Department, was notified and also given the details for the Spill Report Form.

Since the spill was contained and the discharge salvaged, it was below the reportable quantity requiring notification to the Federal Agencies.

The recovered monomer from the tank farm will be pumped into the slop tank and eventually burned with the condensate. The contaminated sand will be kept until we determine how to dispose of it.

W. T. Kerr

W. T. Kerr
Torrance

cc: H. Flynn
C. J. Wierdak

WK:ih

REPORT OF ADDITIONAL SUBSURFACE ASSESSMENT AND GROUNDWATER SAMPLING AMOCO CHEMICAL FACILITY TORRANCE, CALIFORNIA

ENGINEERING
ENTERPRISES, INC.

WATER RESOURCES SPECIALISTS

6695 E Pacific Coast Highway Long Beach, CA 90803 213-430-6500

May 29, 1990

Amoco Chemical Company
1225 West 196th Street
Torrance, California 90502

Attention: Mr. Jeff Campbell
Process Engineer

Subject: Report of Additional Subsurface Assessment and Groundwater Sampling
Amoco Chemical Facility
1225 West 196th Street
Torrance, California
Project No. 512-345

Dear Mr. Campbell:

Presented herewith is the report of subsurface assessment and groundwater sampling performed by Engineering Enterprises, Inc. (EEI). This assessment was performed at the request of Amoco, Inc. to evaluate the presence of styrene, ethylbenzene and associated chemicals in two boreholes and six groundwater monitoring wells at the subject site.

We trust this report meets your current requirements. Should you have questions regarding the results contained herein, or require further clarification, please contact us. We appreciate the opportunity to be of continued service to Amoco.

Respectfully,

William E. Halbert
Project Hydrogeologist

WEH:weh

BPACC01802

REPORT OF ADDITIONAL SUBSURFACE ASSESSMENT AND GROUNDWATER SAMPLING AMOCO CHEMICAL FACILITY 1225 WEST 196TH STREET TORRANCE, CALIFORNIA

Prepared for:

Amoco Chemical Company
1225 West 196th Street
Torrance, California 90502

Submitted by:

Engineering Enterprises, Inc.
6695 East Pacific Coast Highway
Long Beach, California 90803
213/430-6500

William E. Halbert
Project Hydrogeologist

Robert T. Bean
Registered Geologist #1339
CEG #483

BPACC01803

EEI ENGINEERING ENTERPRISES, INC.

REPORT OF ADDITIONAL SUBSURFACE ASSESSMENT AND GROUNDWATER SAMPLING AMOCO CHEMICAL FACILITY 1225 WEST 196TH STREET TORRANCE, CALIFORNIA

TABLE OF CONTENTS

LIST OF FIGURES

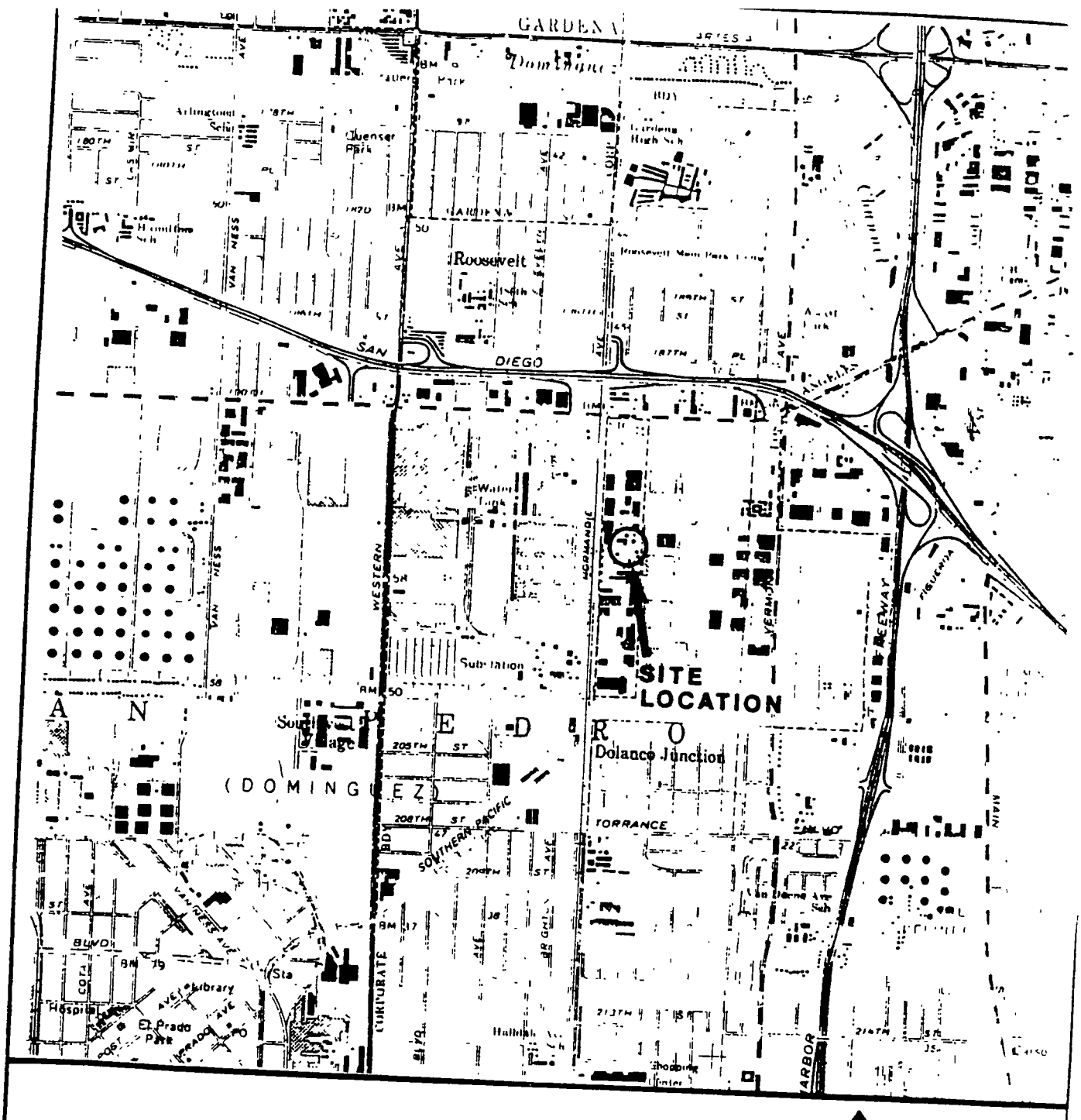
LIST OF TABLES

LIST OF APPENDICES

REPORT OF ADDITIONAL SUBSURFACE ASSESSMENT AND GROUNDWATER SAMPLING AMOCO CHEMICAL FACILITY TORRANCE, CALIFORNIA

1.0 INTRODUCTION

Amoco Chemical Company operates a facility at 1225 West 196th Street, Torrance, California for the conversion of styrene monomer to styrene polymer (Figure 1). Prior to remodeling tank impound areas, Amoco undertook assessment of subsurface soil within the impound area to evaluate the presence and concentration of styrene. This subsurface assessment was performed initially by Engineering Enterprises, Inc. (EEI) through the drilling of five shallow borings to depths of three to five feet below ground surface (bgs) (EEI, 1988). This initial assessment indicated the presence of styrene and ethylbenzene in shallow soil. ENSR, an environmental company, was subsequently retained to further delineate affected soil. ENSR drilled fourteen borings to reported depths of 10 to 20 feet bgs. Styrene was reported to be present in the soil sample collected from 20 feet in borings B-9 and B-13. Amoco retained EEI to drill two borings near ENSR'S borings B-9 and B-13 to depths of 40 feet bgs using a portable drilling rig. Additionally, EEI was requested to obtain groundwater samples from the six groundwater monitoring wells located onsite in two separate events. This report contains the results of the soil sampling and groundwater sampling performed by EEI.



BPT00132

0 2000 4000

SCALE IN FEET

SITE LOCATION MAP
AMOCO CHEMICAL FACILITY
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345

DATE MARCH, 1990

FIGURE. 1

BPACC01808

2.0 PURPOSE

The purpose of the soil and groundwater sampling was to evaluate the vertical extent of styrene in soil to a depth of 40 feet bgs in the area of borings B-9 and B-13 installed by ENSR. Additionally, an evaluation was to be made of volatile organic compounds in groundwater samples collected from onsite monitoring wells.

3.0 SCOPE OF WORK

To achieve the purposes stated above, the following scope of work was performed:

- Drilled two exploratory borings near former borings B-9 and B-13;
- Collected soil samples at five-foot intervals from the exploratory borings;
- Collected groundwater samples from the six onsite groundwater monitoring wells;
- Chemically analyzed 10 soil samples using EPA method 8240;
- Chemically analyzed groundwater samples using EPA method 624; and,
- Prepared this report.

4.0 METHODOLOGY

4.1 Exploratory Borings

Two exploratory borings were installed in approximate locations depicted in Figure 2 using a skid-mounted hydraulic drive drilling rig fitted with 8-inch diameter hollow stem augers. Soil samples were collected at five-foot intervals beginning at the 20-foot

depth using a California modified split barrel sampler fitted with brass sample sleeves. The sampler was driven 18 inches (or refusal) using a 30-inch drop of a 140 pound hammer. Hammer blow counts, which provide a measurement of the relative density of soil, were recorded in six-inch intervals over the 18-inch sampling interval. For reporting purposes, the last two blow counts have been added together and presented as blows per foot.

Following retrieval of the sampler, the soils contained therein were monitored for organic vapors using a photoionization detector and flame ionization detector. The procedure for organic vapor monitoring is contained in Appendix A. Subsequent to vapor screening, the sleeve corresponding to the lowest six inches of the sampled interval was removed, the ends covered with Teflon sheeting and plastic caps and sealed with PVC tape. A label was then affixed to each sealed sample sleeve which contained the following information: sample number, boring number, depth, job numberings, date and collector's name. Sealed and labeled samples were then placed in an ice chest containing blue ice for transport to the analytical laboratory. Chain-of-custody forms were completed in the field and accompanied the samples to the analytical laboratory.

Drilling was conducted under the observation of an EEI geologist who is directly supervised by a California Registered Geologist. The EEI geologist logged soils in accordance with the Unified Soil

Classification System and maintained detailed logs of subsurface soil and organic vapor concentrations encountered. Boring logs are contained in Appendix B.

All downhole drilling equipment was steam cleaned before use to reduce the potential for cross-hole contamination. Samplers were washed in a dilute solution of trisodium phosphate, rinsed in fresh, followed by distilled water and dried between samples. Drill cuttings were collected in DOT-approved 17-H drums, sealed, labeled and are stored onsite pending disposal. Borings were backfilled immediately upon completion using bentonite clay.

4.2 Groundwater Sampling

Groundwater sampling was conducted on the six groundwater monitoring wells located onsite (Figure 2). Prior to sampling, wells were gauged to identify depth of water, (which varied from about 63 to 66 bgs), depth of well and volume of water within the well bore. Wells were then purged of at least five well volumes of water. Measurements of temperature, electrical conductivity and pH were taken during the purging process. When five well volumes of water had been purged and three consecutive readings had stabilized to within ten percent of one another, groundwater samples were collected for laboratory analysis.

Groundwater samples were collected using disposable Teflon bailers fitted with controlled flow emptying devices. Samples were

collected into laboratory clean glass vials having lids with Teflon lined septa and containing hydrochloric acid as a preservative. Samples were transferred from the bailer to the vials using the submerged fill technique. Lids were replaced on the vials and the vials were inverted and visually checked for the presence of air bubbles. Samples containing air were uncapped, refilled and rechecked. Samples not containing air had labels affixed which contained the following information: date, sampler's initials, job number, well number, sample number and requested analyses. Appropriately sealed and labeled samples were then placed in an ice chest containing frozen blue-ice for transport to the analytical laboratory. Chain-of-custody forms were completed in the field and accompanied the samples to the laboratory. Bailers were discarded after use at each well.

A second groundwater sampling event was conducted in a manner identical to the first with the following additions: 1) a field blank was collected by pouring distilled water into a clean bailer and then decanting the water into sample vials, and 2) a trip blank was provided by the laboratory and accompanied the sample vials during the sampling event.

4.3 Chemical Analyses

Soil samples collected from the exploratory borings were analyzed using EPA method 8240 for volatile organic compounds. Groundwater samples were analyzed using EPA method 624 for purgeable compounds.

5.0 DISCUSSION OF RESULTS

No detectable concentrations of analyzed compounds were reported in soil samples collected from boring B-1. Soil samples from boring B-2 did not contain detectable concentrations of analyzed compounds at depths of 20 and 25 feet bgs. The soil sample collected from 30 feet contained carbon disulfide at a reported concentration of 0.14 milligrams per kilogram (mg/kg) and trichloroethene at a reported concentration of 0.11 mg/kg. The soil sample collected from a depth of 35 feet bgs contained reported concentrations of carbon disulfide at 0.06 mg/kg, trichloroethene at 0.86 mg/kg, and benzene at 0.05 mg/kg. The soil sample collected from a depth of 40 feet bgs contained reported concentrations of trichloroethene at 0.15 mg/kg, tetrachloroethene at 0.2 mg/kg and 1,1,1 trichloroethane at 0.07 mg/kg. Presented in Table 1 are laboratory results for soil samples from boring B-2. Laboratory reports for soil samples are contained in Appendix C, Part 1.

TABLE 1

LABORATORY RESULTS - BORING B-2(a)

Depth (ft.)	Benzene	Carbon Disulfide	TCE(b)	PCE(c)	1,1,1-TCA(d)
20	ND(0.05)	ND(.05)(e)	ND(0.05)	ND(0.05)	ND(0.05)
25	ND(0.05)	ND(.05)	ND(0.05)	ND(0.05)	ND(0.05)
30	ND(0.05)	0.14	0.11	ND(0.05)	ND(0.05)
35	0.05	0.06	0.86	ND(0.05)	ND(0.05)
40	ND(0.05)	ND(0.05)	0.15	0.20	0.07

(a) All concentrations reported in milligrams per kilogram.
(b) TCE = Trichloroethene.
(c) PCE = Tetrachloroethene.
(d) TCA = Trichloroethane.
(e) ND = Not detected above concentration in parentheses.

Groundwater samples collected 2-1-90 from all six wells all contained detectable concentrations of trichloroethene (TCE) ranging from 500 to 5,800 micrograms per liter (ug/L). Tetrachloroethene (PCE) was detected in wells OW-2 to OW-6 in the concentration range from 50 ug/L to 1,600 ug/L. PCE was not detected in OW-1 above a detection limit of 80 ug/L. The compounds 1,1-dichloroethene and 1,2-dichloroethene (total) were detected in wells OW-4, OW-5 and OW-6 in reported concentrations ranging from 17 ug/L to 200 ug/L. Of these two compounds, only 1,2-dichloroethene was detected in OW-3 at a concentration of 54 ug/L. Neither compound was reported to be present in groundwater samples from wells OW-1 and OW-2 above detection limits of 80 ug/L and 4 ug/L,

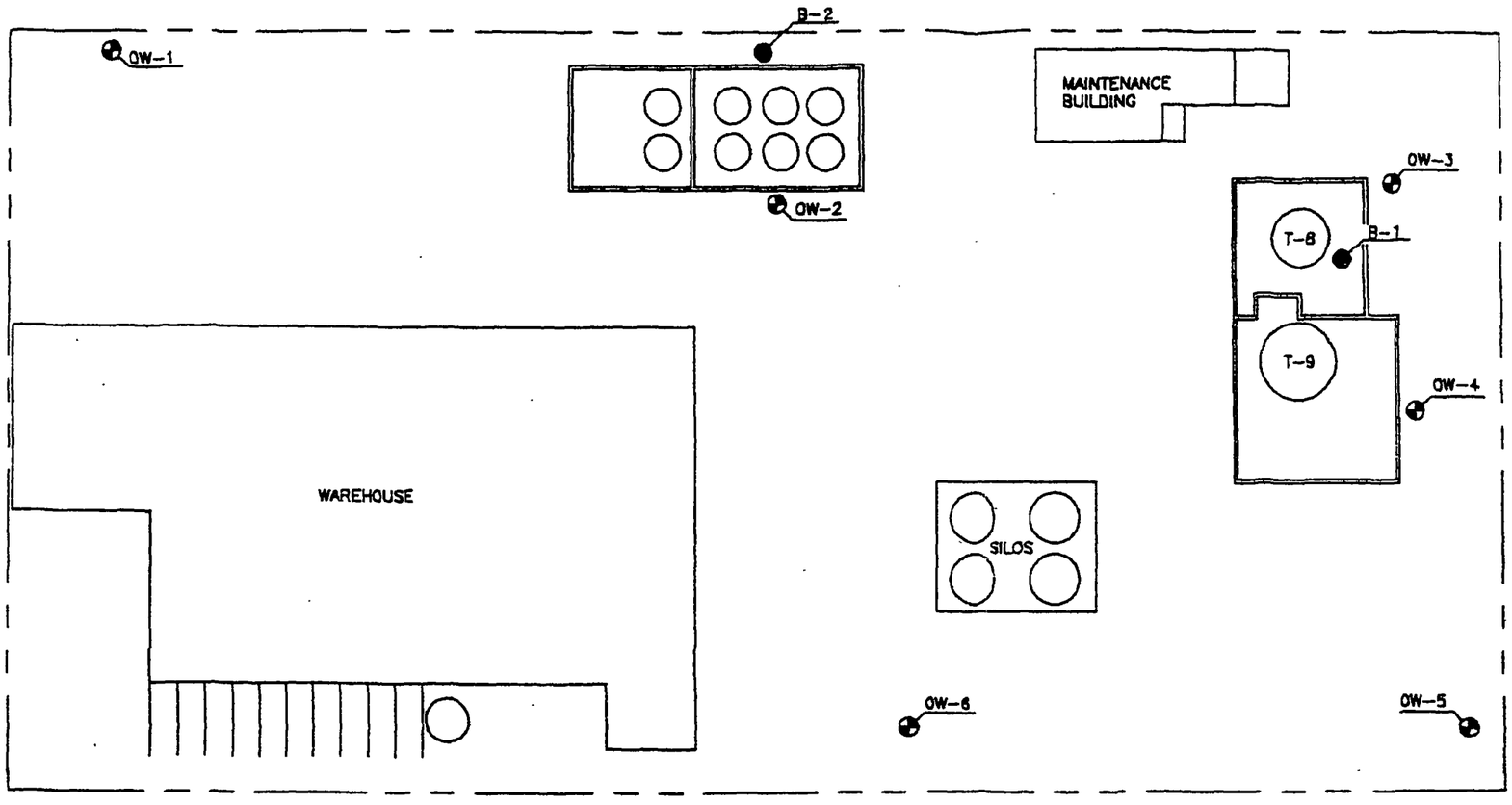
respectively. Methylene chloride was reported only in the water sample collected from well OW-1 at a concentration of 10,000 ug/L. Presented in Table 2 are the reported concentrations for detected compounds. Appendix C, Part 2, contains the laboratory reports from the first groundwater analytical event. A relative groundwater elevation contour map for this sampling event is presented in Figure 3. Concentration maps for PCE, TCE and 1,2-dichloroethene are presented in Figures 4, 5 and 6, respectively.

TABLE 2

LABORATORY RESULTS - GROUNDWATER SAMPLING
DATE 2-1-90(a)

Compound	Monitoring Well No.						
	OW-1	OW-2	OW-22 (Duplicate of OW-2)	OW-3	OW-4	OW-5	OW-6
1,1-DCE(b)	ND80(c)	ND4	ND5	ND15	17	63	21
1,2 DCE (Total)	ND80	ND4	ND5	54	64	200	21
Methylene Chloride	10000	ND20	ND25	ND75	ND50	ND200	ND75
TCE(d)	1000	500	625	1700	1400	5800	1900
PCE(e)	ND80	50	68	240	310	1600	780

(a) Concentrations in micrograms per liter.
(b) DCE = Dichloroethene.
(c) ND = Not detected above concentration shown.
(d) TCE = Trichloroethene.
(e) PCE = Tetrachloroethene.



OW-3 MONITORING WELL NUMBER

B-1 EXPLORATORY BORING LOCATION

N

BPACC01816

0 40 80

SCALE IN FEET

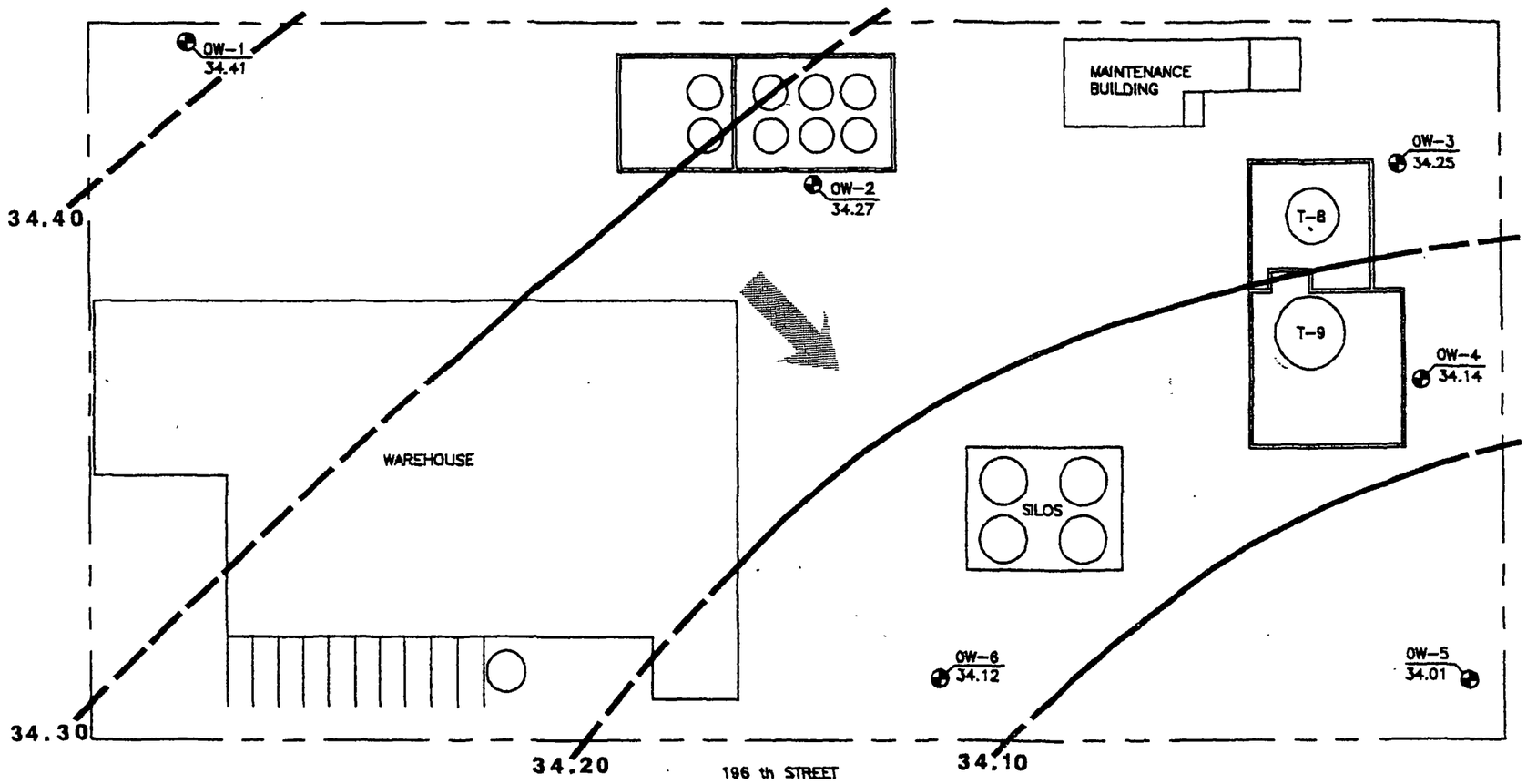
BORING AND MONITORING WELL LOCATION MAP
WEST 196th STREET
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345

DATE: MARCH, 1990

FIGURE: 2



OW-3 — MONITORING WELL NUMBER
34.25 — RELATIVE GROUNDWATER ELEVATION (feet)

34.20 — GROUNDWATER ELEVATION CONTOUR (Dashed where inferred)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: 1. Data collected February 1, 1990.
2. Elevations in feet relative to arbitrary benchmark.

BPACC01817

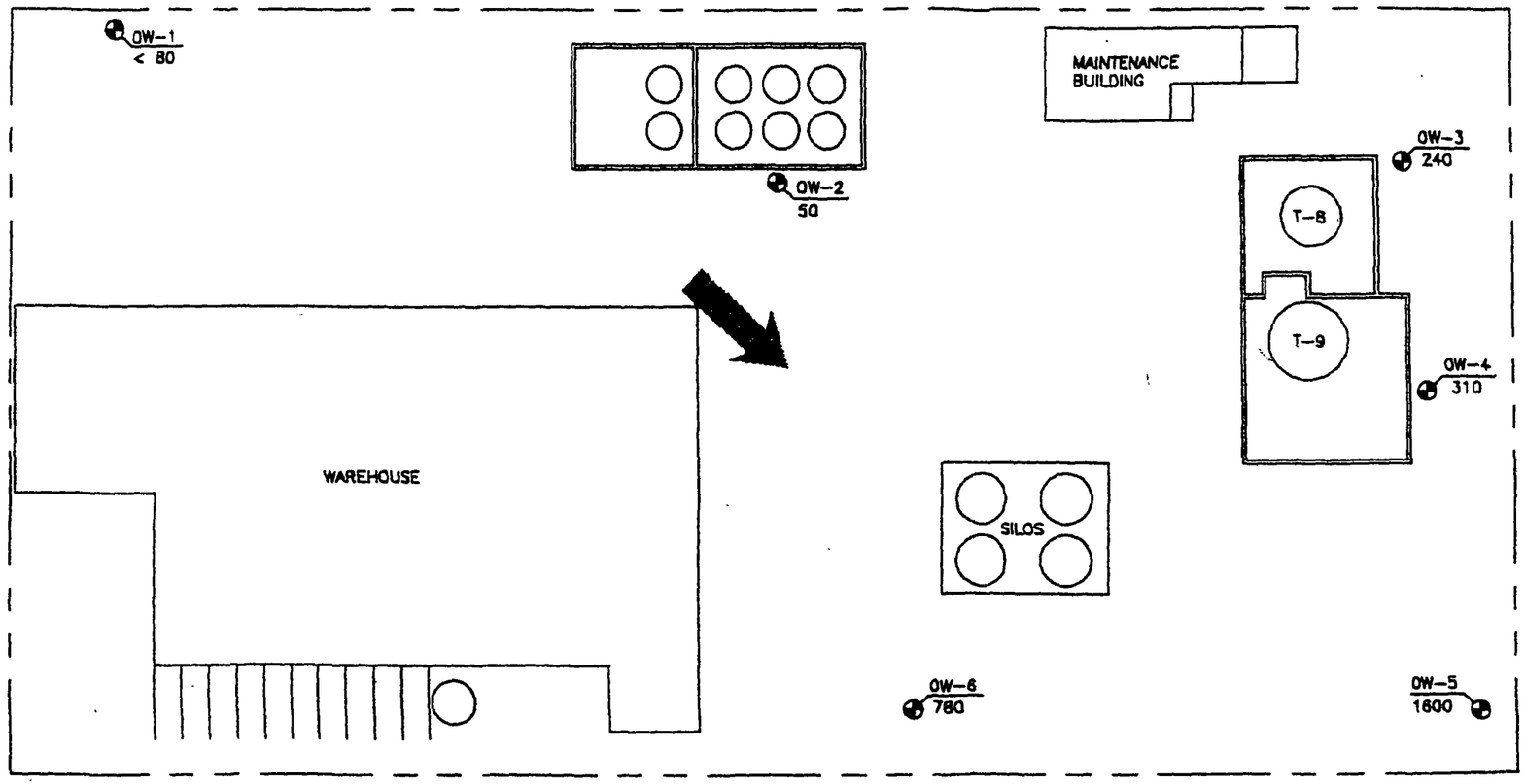
N

0 40 80
SCALE IN FEET

RELATIVE GROUNDWATER ELEVATION
CONTOUR MAP
1225 WEST 196th STREET
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345
DATE: MARCH, 1990
FIGURE: 3



OW-3 240 — MONITORING WELL NUMBER / TETRACHLOROETHENE CONCENTRATION (ug/L)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: 1. Data collected February 1, 1990.

BPACC01818

N

0 40 80

SCALE IN FEET

TETRACHLOROETHENE CONCENTRATION MAP

1225 WEST 196th STREET

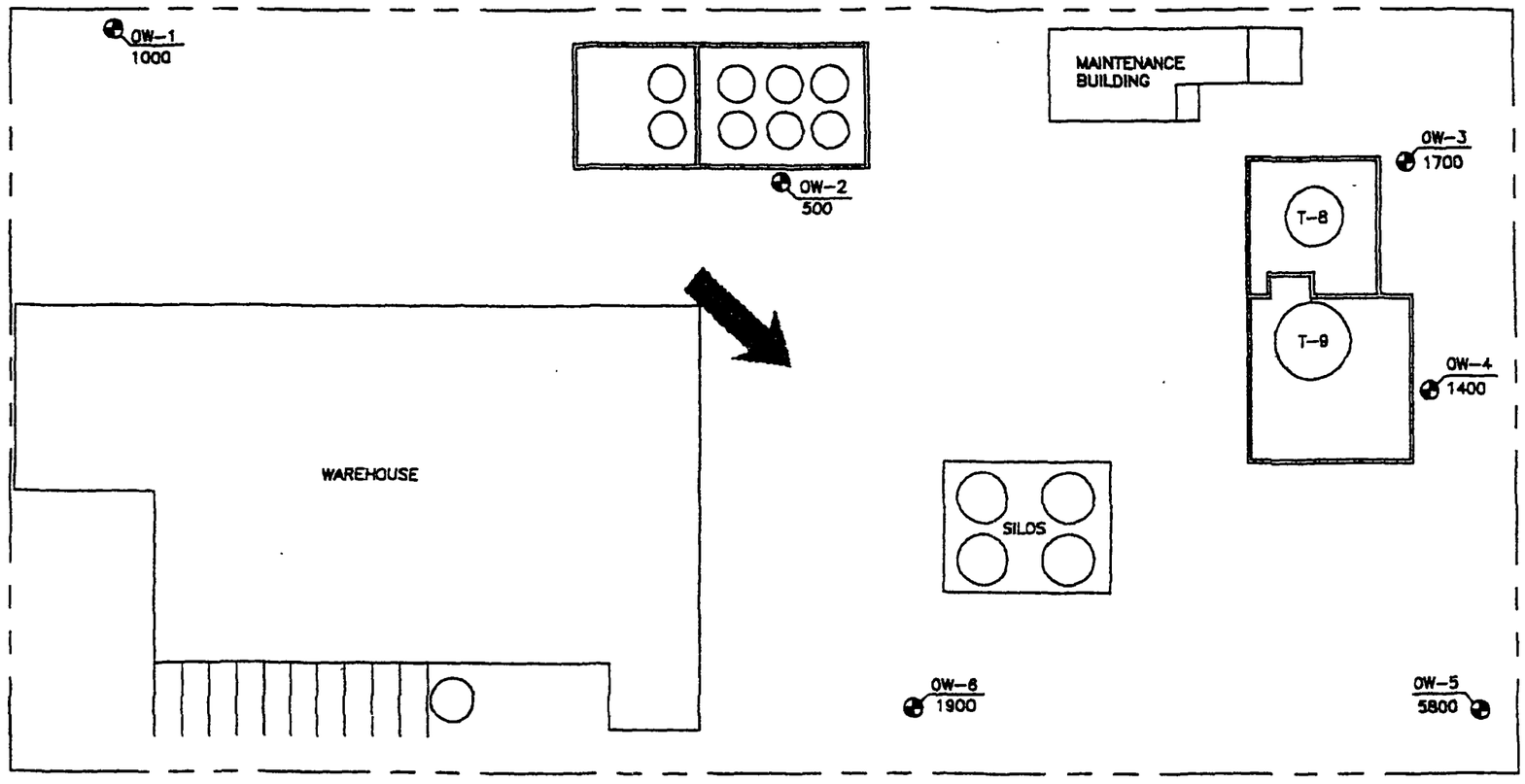
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345

DATE: MARCH, 1990

FIGURE: 4



OW-3 — MONITORING WELL NUMBER
1700 — TRICHLOROETHENE CONCENTRATION (ug/L)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: 1. Data collected February 1, 1990.

BPACC01819

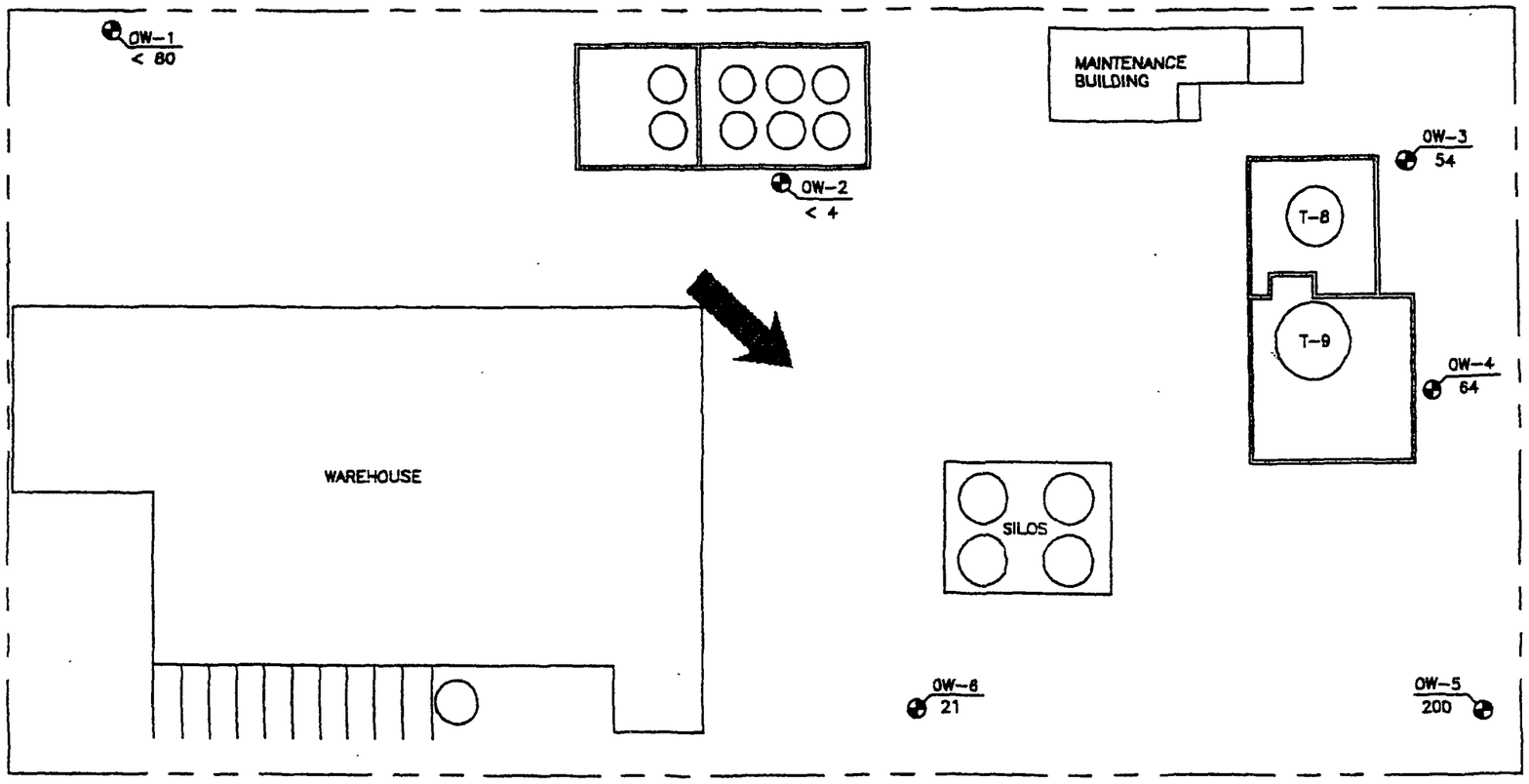
N

0 40 80
SCALE IN FEET

TRICHLOROETHENE CONCENTRATION MAP
1225 WEST 196th STREET
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345	FIGURE: 5
DATE: MARCH, 1990	



OW-3 54 — MONITORING WELL NUMBER; 1,2 DICHLOROETHENE CONCENTRATION (ug/L)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: 1. Data collected February 1, 1990.

BPACC01820

N

0 40 80

SCALE IN FEET

1,2 DICHLOROETHENE CONCENTRATION MAP

1225 WEST 196th STREET

TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345

DATE: MARCH, 1990

FIGURE: 6

Groundwater samples were collected during a second sampling event (2-21-90) to confirm detections reported in the first event (2-1-90). In general, reported concentrations from the second sampling and analytical event were at least twice the concentrations reported from the first event. Compounds detected in the second sampling event but not the first include chlorobenzene and total xylenes at 2,800 ug/L and 210 ug/L respectively in the sample from well OW-6. Reported concentrations from the second sampling event are presented in Table 3, below. A relative groundwater elevation contour map for the second sampling event is presented in Figure 7. Concentration maps for PCE, TCE and 1,2-dichloroethene are presented in Figures 8, 9 and 10, respectively. Laboratory reports are contained in Appendix C, Part 3.

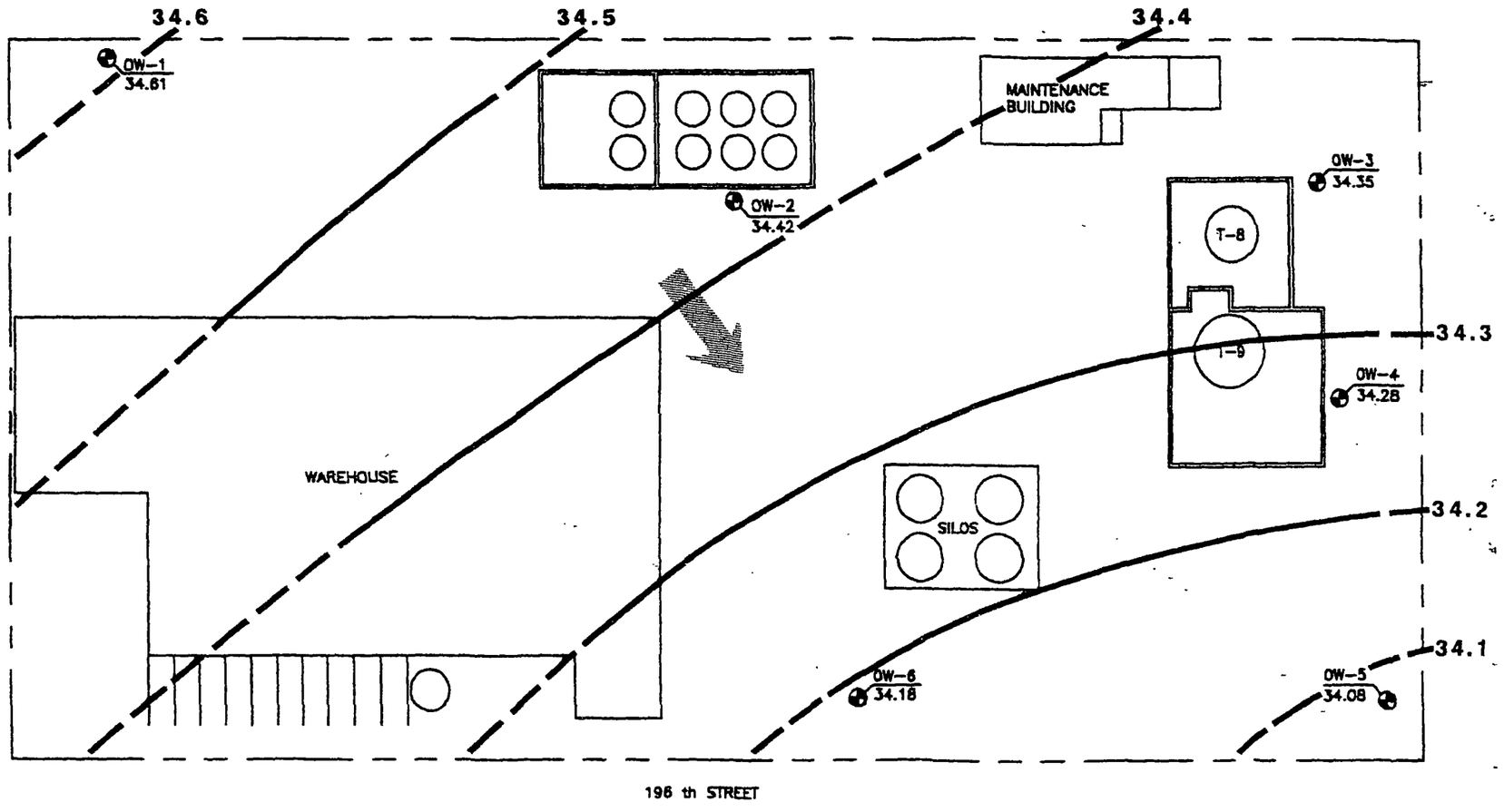
TABLE 3

LABORATORY RESULTS - GROUNDWATER SAMPLING
DATE 2-21-90(a)

Compound	Monitoring Well No.						
	OW-1	OW-2	OW-3	OW-4	OW-5	OW-22 (Duplicate of OW-5)	OW-6
Methylene Chloride	190000	ND25(b)	ND100	ND75	ND400	ND500	ND200
1,1-DCE(c)	ND1500	ND5	35	ND15	130	100	56
1,2-DCE (Total)	ND1500	6	150	87	380	380	59
TCE(d)	2200	1100	3800	3400	15000	16000	7800
PCE(e)	ND1500	160	1100	400	5900	5100	3300
Chlorobenzene	ND1500	ND5	ND20	ND15	ND80	ND100	2800
Xylenes	ND1500	ND5	ND20	ND15	ND80	ND100	210

(a) Concentrations reported in micrograms per liter.
(b) ND = Not detected above concentration shown.
(c) DCE = Dichloroethene.
(d) TCE = Trichloroethene.
(e) PCE = Tetrachloroethene.

BPACC01821



OW-3 MONITORING WELL NUMBER
34.35 RELATIVE GROUNDWATER ELEVATION (feet)

34.3 GROUNDWATER ELEVATION CONTOUR (Dashed where inferred)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: 1. Data collected February 21, 1990.
2. Elevations in feet relative to arbitrary benchmark

BPACC01822

N

0 40 80

SCALE IN FEET

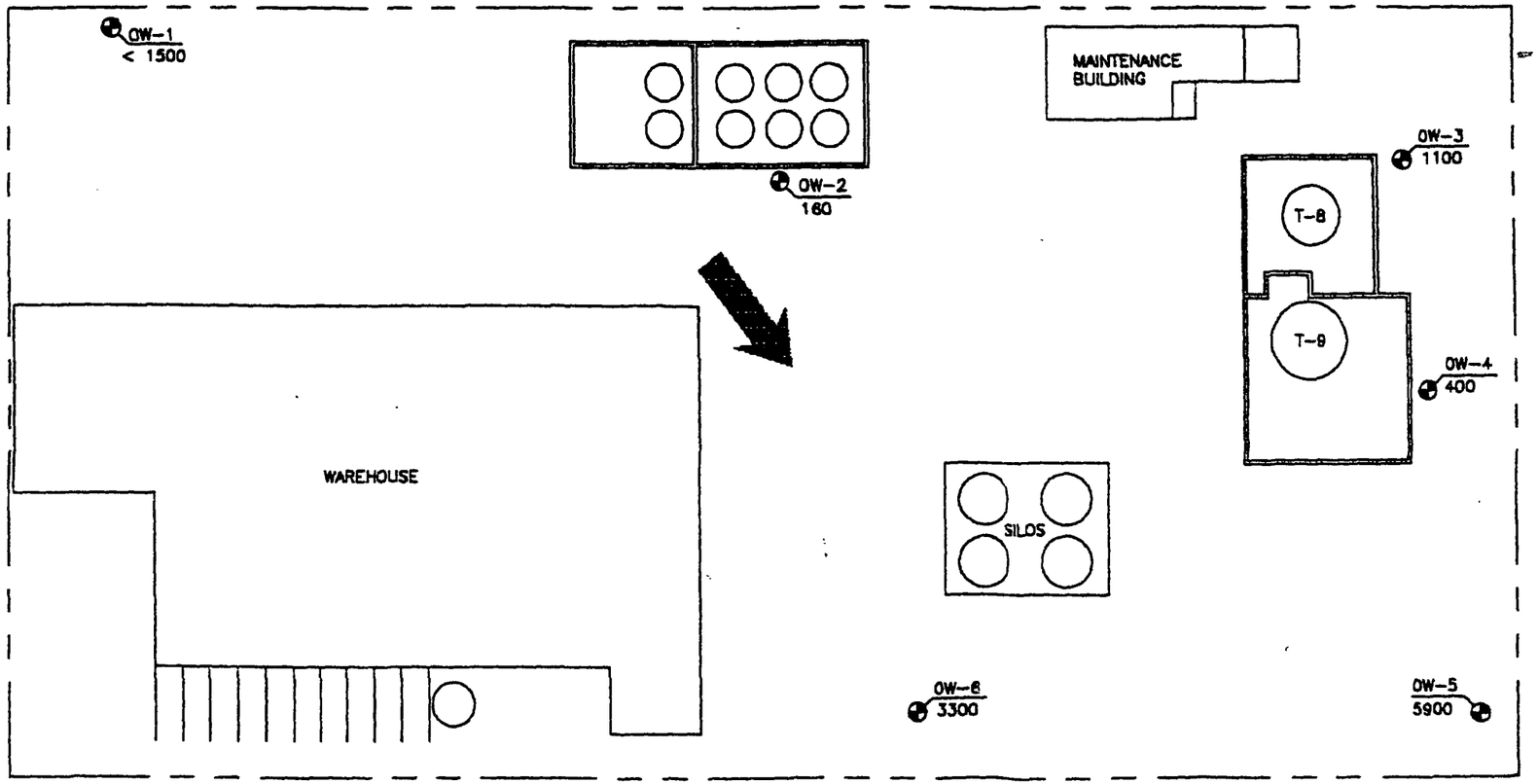
RELATIVE GROUNDWATER ELEVATION
CONTOUR MAP
1225 WEST 196th STREET
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345

FIGURE: 7

DATE: MARCH, 1990



OW-3 MONITORING WELL NUMBER
1100 TETRACHLOROETHENE CONCENTRATION (ug/L)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: 1. Data collected February 21, 1990.

BPACC01823

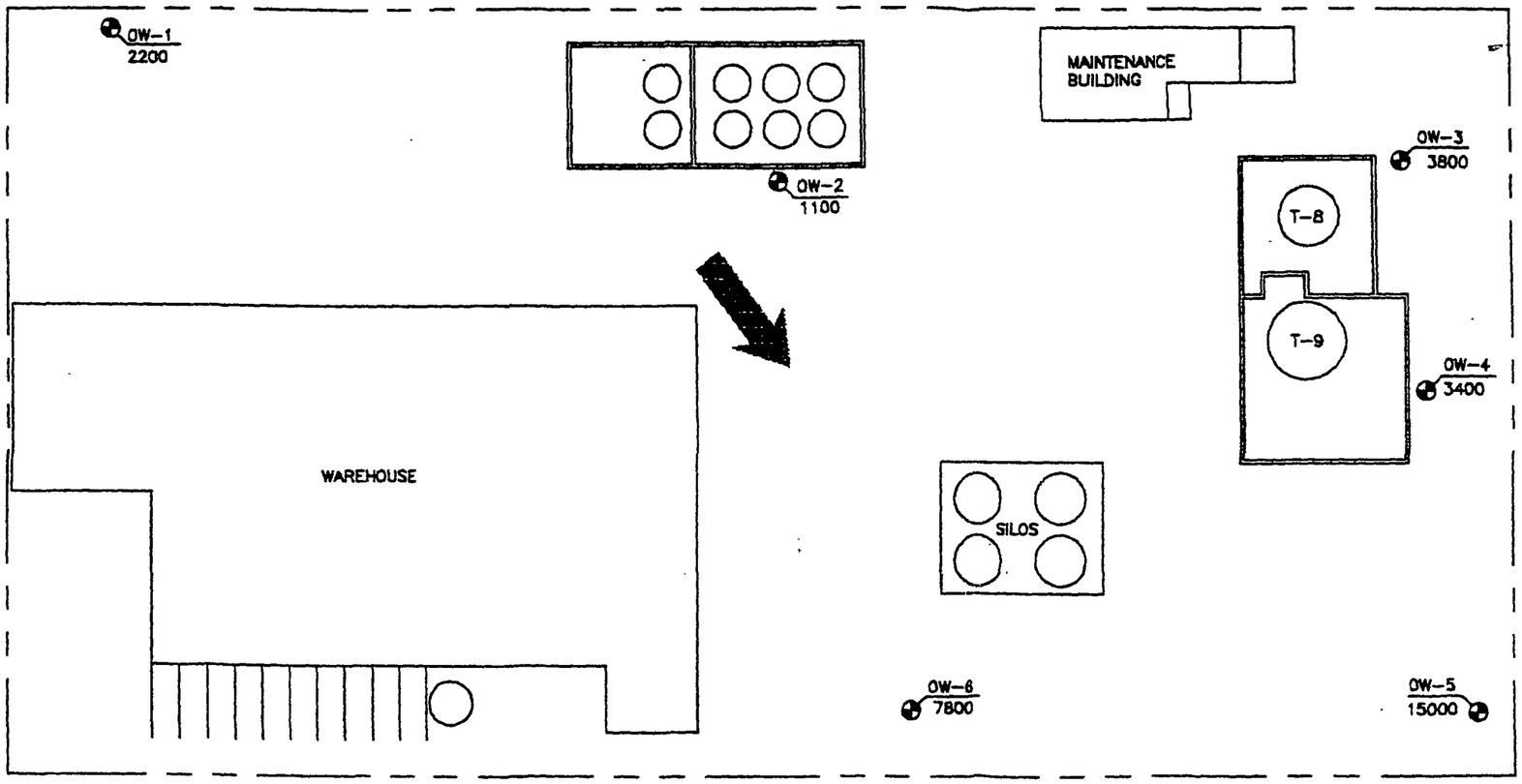
N

0 40 80
SCALE IN FEET

TETRACHLOROETHENE CONCENTRATION MAP
1225 WEST 196th STREET
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345
DATE: MARCH, 1990
FIGURE: 8



OW-3 — MONITORING WELL NUMBER
3800 — TRICHLOROETHENE CONCENTRATION (ug/L)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: 1. Data collected February 21, 1990.

BPACC01824

N

0 40 80

SCALE IN FEET

TRICHLOROETHENE CONCENTRATION MAP

1225 WEST 196th STREET

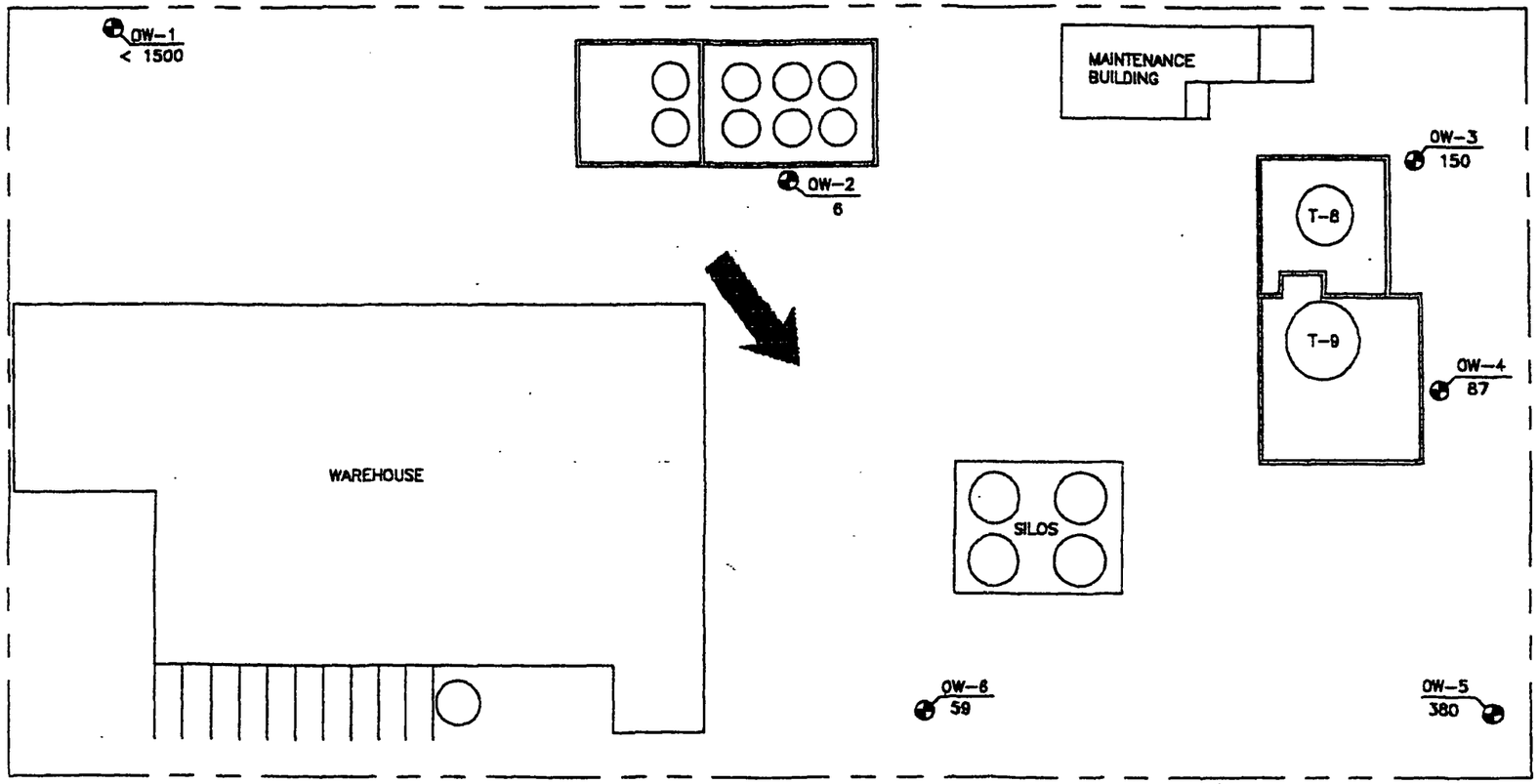
TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345

DATE: MARCH, 1990

FIGURE: 9



OW-3 MONITORING WELL NUMBER
150 1,2 DICHLOROETHENE CONCENTRATION (ug/L)

APPROXIMATE DIRECTION OF GROUNDWATER FLOW

NOTE: 1. Data collected February 21, 1990.

BPACC01825

N

0 40 80
SCALE IN FEET

1,2 DICHLOROETHENE CONCENTRATION MAP

1225 WEST 196th STREET

TORRANCE, CALIFORNIA

EEI ENGINEERING ENTERPRISES, INC.

PROJECT NO: 512-345

DATE: MARCH, 1990

FIGURE: 10

6.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the analytical results presented above, the following conclusions are made:

- o First groundwater at the site occurs under unconfined conditions at a depth of about 63 to 66 feet below ground surface with a flow direction to the southeast having a gradient varying from about 0.001 to 0.0015.
- o Groundwater at the site contains detectable concentrations of purgeable compounds, specifically methylene chloride, 1,1- and 1,2-dichloroethane, TCE, PCE, chlorobenzene and total xylenes.
- o Concentrations of the above chemicals increase in a downgradient direction.
- o No detectable concentrations of styrene or ethylbenzene were reported to be present in analyzed soil samples from borings B-1 and B-2.
- o Detectable concentrations of TCE, PCE, carbon disulfide, benzene and/or 1,1,1-trichloroethane were present in soil samples collected at or below the 30-foot sampling interval in boring B-2.
- o Based on communication with Amoco employees, TCE, PCE, carbon disulfide, benzene and xylene have never been used in the processes onsite.
- o Soil and groundwater appear to be affected by an offsite source due to the lack of historical data indicating use of detected compounds on the property.

Based on the conclusions presented above, the following recommendation is offered:

- o Biannual sampling of groundwater monitoring wells to monitor chemical concentrations.

7.0 LIMITATIONS

The conclusions and recommendations presented above are based upon:

- Observations and vapor readings collected during the drilling of two exploratory borings and sampling of six groundwater monitoring wells;
- Results of laboratory analyses conducted on soil and groundwater samples by Analytical Technologies, Inc. of San Diego, California; and
- Review of portions of previous consultant's reports supplied by Amoco.

It is possible that variations in soil and groundwater conditions exist beyond the points explored in this assessment. Also, changes in groundwater conditions may occur at some future time due to fluctuations in rainfall, regional water uses, or other factors.

Engineering Enterprises, Inc. warrants their services provided in conjunction with this assessment were performed in a manner consistent with a level of care and skill ordinarily exercised by members of our profession currently practicing in the Los Angeles County area. No other warranty, expressed or implied, is made.

8.0 REFERENCES

Engineering Enterprises, Inc., 1988, Report of Shallow Soil Sampling, Amoco Chemical Facility, Torrance, California.

APPENDIX A

SOIL SAMPLE VAPOR SCREENING METHODOLOGY

APPENDIX A

SOIL SAMPLE VAPOR SCREENING METHODOLOGY

Presented below is the basic methodology for field screening of soil sample vapor. The screening is performed using an HNU Model P101 and/or Photo-Vac tip portable photoionization detector (PID) or a Foxboro OVA Flame Ionization Detector (FID). These detectors provide a non-discriminatory indication of the presence of a variety of organic compounds and can be used for relative quantification of organic compound presence. With this capability, the detectors serve as useful tools in the screening of soil samples in the field. The basic method for field screening of a soil sample with the detector is as follows:

1) The soil sample is removed from the sample tube or tip of the sampler and approximately one cubic inch is placed in a sealable polyethylene bag with a capacity of approximately 500 milliliters.

2) The sample is crushed through the walls of the bag to provide greater surface area for vapor outgassing.

3) Outgassing of the sample is allowed for approximately five minutes at ambient air temperature.

4) The bag is then pierced with the probe of the analyzer and the vapors are drawn out of the bag using the analyzer pump.

5) Readings are noted from the initial insertion to when the bag is collapsed. The sustained value for the reading is recorded unless there is moisture interference. In this case, the initial high reading is recorded before moisture interferences causes the reading to diminish.

6) If soil or excessive moisture is drawn into the instrument, the sample probe is thoroughly cleaned and air is passed through the system until the zero or background level is attained.

7) Readings are tabulated with the boring number and depth of the sample noted on the field log which is maintained by the on-site geologist.

APPENDIX B

BORING LOGS

BORING: EEI-1	FILE NAME: EEI1
PROJECT NAME: AMOCO	PROJECT NO. 512-345
LOCATION/COORDINATES: East of Tank No. T-8	RIG TYPE: Soil Master
SCHEDULE / WATER LEVEL	SAMPLING METHOD: SS
INITIATED: 2-15-90 / DEPTH: NA	DRILLING CO: West Hazmat Drilling Corp.
COMPLETED: 2-15-90 / DATE: NA	DRILLED BY: M.Smith
BACKFILLED: 2-15-90 / TIME: NA	LOGGED BY: B.Charest
GROUND ELEVATION: -- / BORING DEPTH: 40'	SHEET 1 OF 2

DEPTH IN FEET	SAMPLE NUMBER	DEPTH	TYPE	BLOWS	PID ppm	OVA ppm	USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0					180	110			Cemented gravel to 1" diameter	
							CL		SILTY CLAY: Dark brown (10YR-2/2); slightly moist	
5					40	28			yellowish brown (10YR-5/6); slightly moist	
10					60	33				
15					64	44				
					0	0	-- SP		SAND: Light olive brown (2.5Y-5/4); fine little silt; trace coarse; slightly moist	
20	S-1-20		SS	33	13	5.8	-- CL		SILTY CLAY: Light olive brown (2.5YR-5/4) slightly moist	BPACC01831

Denotes Laboratory Sample

EEI ENGINEERING ENTERPRISES, INC.

BORING: B-2 Cont. FILE NAME: B2-2

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	DEPTH	TYPE	BLOWS	PID ppm	SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
25	1-2-25		SH	28	3	ML		CLAYEY SILT: Light olive brown (2.5Y-5/4); some clay; slightly moist; very stiff	
30	1-3-30		SH	58	8	SP		SAND: Light olive brown (2.5Y-5/4); poorly graded; fine to medium; micaceous; trace silt; moist; very dense	
35	1-4-35		SH	24	4	ML		CLAYEY SILT: Light yellowish brown (2.5Y-6/4); little clay; trace fine sand; slightly moist; very stiff	
40	1-5-40		SH	44	2	SM		SILTY SAND: Light yellowish brown (2.5Y-5/4); poorly graded; fine; little silt; moist; hard	
45									
50									

BPACC01832

EEI ENGINEERING ENTERPRISES, INC.

BORING: B-2		FILE NAME: B2
PROJECT NAME: AMOCO TORRANCE		PROJECT NO. 512-350
LOCATION/COORDINATES:		RIG TYPE: Soil Master
SCHEDULE	WATER LEVEL	SAMPLING METHOD: SH
INITIATED: 2-15-90	DEPTH: NA	DRILLING CO: West Hazmat
COMPLETED: 2-15-90	DATE: NA	DRILLED BY: M.Smith
BACKFILLED: 2-15-90	TIME: NA	LOGGED BY: T.Danaher
GROUND ELEVATION: NA	BORING DEPTH: 40'	SHEET 1 OF 2

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	DEPTH	TYPE	BLOWS	PID ppm	SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
0									
5	GS1-1-5		GS	NA	5	CL		CLAY: Dark greyish brown (10YR-4/2); little silt; trace fine sand; moist; medium stiff	
10	GS1-2-10		GS	NA	5			dark greyish brown (10YR-5/3); stiff	
15	GS1-3-15		GS	NA	3			dark yellowish brown (10YR-4/3); trace coarse sand	
						-- SM		SILTY SAND: Very dark greyish brown; graded; fine; little silt; little clay; moist; medium dense (est.)	
20	1-1-20		SS	29	0	-- SP		SAND: Light yellowish brown (2.5Y-6/4); poorly graded; fine; trace silt; moist; medium dense	

BPACC01833

EEI ENGINEERING ENTERPRISES, INC.

BORING: EEI-1 Cont. FILE NAME: EEI1-2

SHEET 2 OF 2

DEPTH IN FEET	SAMPLE DATA: SAMPLE NUMBER	DEPTH	TYPE	BLOWS	PID ppm	OVA ppm	SOIL TYPE: USCS	SYMBOL	SOIL DESCRIPTION	REMARKS
25	S-1-25		SS	29	20	50	SM		SILTY SAND: Light olive brown (2.5YR-5/4); poorly sorted; slightly moist; trace mica	
30	S-1-30		SS	35	14	5.4	SP		SAND: Light olive brown (2.5YR-5/4); fine to coarse; poorly sorted; slightly moist; micaceous	
35	S-1-35		SS	47	5	1.6	ML		SILT: Light olive brown (2.5YR-5/4); clayey very fine sandy; low moisture; micaceous	
40	S-1-40		SS	47	3.5	2.6	SP		SAND: Pale yellow (5Y-7/3); silty very fine to fine; poorly sorted; slightly moist; trace mica	
45										
50										

BPACC01834

Denotes Laboratory Sample

EEI ENGINEERING ENTERPRISES, INC.